State of Maryland

BOARD OF NATURAL RESOURCES

SYMPOSIUM

Maryland Conservation Forum

April 12, 1944

June, 1944

EDUCATIONAL SERIES, NO. 4

DEPARTMENT OF RESEARCH AND EDUCATION
Solomons Island, Maryland

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PREFACE

The papers offered in this Symposium were presented at the Maryland Conservation Form held in Baltimore on April 12, 1944. The authors are too well known in their respective fields of interest to need special introduction to the reader. The movement that culminated in the Forum program is worthy of much further elaboration than is possible in this preface.

There has been a marked awakening of interest in the State's vast resources, potential and real, during the past decade. As a result of this interest, new agencies have been created and many revived, and outright new programs for conservation development have been furthered. The base of Maryland's conservation interest and action has been expanded in keeping with, if not in lead of, the growing national consciousness that a birthright is at stake, and that the security and progress of this and future generations of Americans demand maintenance, rehabilitation and wisest use of natural resources.

The aim of the several agencies and individuals (listed hereinafter) who initiated the Forum project was to broaden still further the conservation base referred to in order to reach and alter the very mores of those who control, ultimately, conservation programs and policies, that is, the people who work with and earn their livelihood from natural resources, locally and country-wide. The success of the movement will be measurable only as time passes. Immediate response to the Forum program on the part of a big and enthusiastic audience presaged a bright future in this field of endeavor.

R. V. TRUITT, Director,
Department of Research and Education

Introductory Remarks, Morning Session

JOHN W. SHERWOOD
Forum Chairman

The Maryland Conservation Forum has been conceived, planned and organized by a group of public spirited citizens who are untouched by the influence of politics or business. We represent no loyalties except to our beloved State of Maryland and we have no creed except conservation. Not only are we free of all political alliances but we hope eventually to remove our natural resources entirely from the realm of politics for, after all, these resources are no more fit objects of politics than our public health, our public schools, or our public roads. One of our final aims is that Maryland shall become a model state for its conservation legislation.

But our immediate aim for today is the better understanding of our natural resources. We want to know their extent and the condition, methods, and problems of conserving them both for ourselves and for future generations. We have therefore assembled here the heads of our own state conservation agencies who will describe the Maryland conditions. In addition, we have laid our plans before the ablest conservation authorities of the whole country, and these men have not only enthusiastically approved our aims, but each has come here to discuss his own field. I am convinced that there has never been assembled such a large and able group of conservation authorities; and the size and the interest of this audience persuade me that the Conservation Forum will be the beginning of a great movement for the betterment of Maryland.

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Greetings

HONORABLE THEODORE R. McKELDIN

Mayor of Baltimore City

It is a pleasure, as Mayor of this great city, to extend to you greetings on behalf of the people of Baltimore. I can assure you that we, in the City, are deeply cognizant of the need of sound conservation in Maryland and we appreciate the forward thinking and action that has brought to fruit this excellent program and the fine group of specialists presented on it to treat with the problem at this critical time of war over-draft on natural resources. It is a good omen for the future to see such a splendid group of men and women gathered from all sections of our State to have these assets appraised and to discuss ways and means by which our outstanding natural wealth may be conserved and handed on to posterity.

I am told that this meeting grew out of a suggestion made by a group of ladies, among them Mrs. Bartlett Johnson, Mrs. Hall Hammond, Mrs. Harry Slack and others. Standing on the side lines, I have observed for a number of years the part that women are playing in this field. It can be nothing less than an unselfish service on their part, and when any group apply themselves to a large problem in an unselfish spirit, it is time for opposition to look out.

It would not become me to tell you that I know all about conservation. I am a city-bred man, but I do know that there is a no more important question facing the American people that the conservation of our natural wealth and, in many instances, the restoration of natural resources which have been allowed to become depleted through lack of execution of sound management programs.

It would greatly confirm and enlighten me if I could sit with you today and hear the over-all picture presented by your speakers from out of the city and then to listen to Dr. Truitt who will bring to you the scientific method of dealing with the problems that we face—that, to paraphrase the farmer's slogan, of how to make two trees or two birds grow where one grew before, and how from such work there is being developed and effectuated comprehensive programs for the rehabilitation of our great resources. I should like to hear Mr. Edwin Warfield outline his Commission's plan for carrying into effect the program which is being devised from the findings of research to restore our seafood industries. I should like to hear him tell us of his efforts and his success in bringing about better relations in conservation between Maryland and her sister states.

Then, I should like to hear a discussion on the part of Dr. Symons and

the federal specialists on the Forum's program dealing with methods that are being developed for conserving the soil of our State, that basic resource from which national wellbeing and progress arise. Our Baltimore people recognize that soil erosion does more than disturb their water supply; it is essential that it be checked in order to preserve their bread basket and to maintain a sound economy and way of life.

As for the State's timber resources, we are conscious of the value of forests in conserving soil, water sheds and, we are told, our climate, apart from their intrinsic worth in lumber, cordwood, paper production and the like. We have seen devastation in many sections of the State because of mismanagement and ignorance, and I congratulate the State on having developed a sound, broad program for conserving the timber resources, thereby helping to create anew the basis of top soil building and water conservation as well as to extend the forest economy, yes, even into the City.

Sportsmen are numerous and concerned, greatly, that sounder and more effective conservation principles and practices be instituted and maintained. It is the good fortune of Maryland, and especially of Baltimore, that this segment of our population has organized and is prepared to work for a going conservation program. It is especially pleasing to me to observe that these same men and women are not merely fighting for more fish, or more birds or more rabbits to meet their own whims or Nimrod desires, but that to the contrary they want to preserve and extend natural beauty, to abate pollution, more productive covers, greater abundance of fish for the commercial waterman as well as their own rods, and a sounder system of conservation in general, in order that the out-of-doors will remain a better place to frequent, a tonic for the adventurer and the basis for a firmer and lasting economy.

Let me repeat, in concluding greetings to you on this occasion, that we feel this meeting today is a marked step forward in the further awakening of a consciousness of the extreme esthetic and practical values to be found in Maryland's great natural and conservable assets. We recognize the place of giant wheels of industry, among other things, in the economy and general progress of the City, but we at no time will lose sight of the fact that the soil, the underground waters, the timber and the seafoods are the basis of national and State, therefore City, security.

In conclusion, let me congratulate this assembled group, as well as my friend John W. Sherwood for his untiring energy and splendid guidance in the development of this program. When we see men like Glenn L. Martin, William Schluderberg and John Sherwood, leaders in this movement, giving unstintedly of their time and thought to the study of con-

servation, as these men are doing, it is a good omen and makes us all feel a greater degree of security for the future. It indicates that your children and my children, when they grow up, will inherit from us the major pleasures and privileges that have been ours, and rightly so for God has only lent us the earth to live upon and it should and does belong as much to them as it does to us. We have no right to deprive them of any part of this birth-right.

Soil Conservation In Maryland

T. B. SYMONS
Chairman
State Soil Conservation Committee

This opportunity to represent the State Soil Conservation Committee and the large body of cooperators and farmers who are working so faithfully for the preservation of our soil is greatly appreciated by me. We all welcome this aroused interest on the part of the people of the state, both rural and urban, in the vital importance of the conservation of our natural resources, but especially the soil.

Our feverish activity in the war effort makes it more necessary than ever to prevent further losses. In order to attain crop production goals, larger acreages are being devoted to cultivation and row crops than ever before. There are correspondingly larger possibilities for soil erosion and depletion unless the greatest care is exercised. We must not allow this war to accelerate the wastage of our soils.

Someone has said, "The land will make nations great, and the land will destroy them." Without topsoil we should all perish. In the past, civilizations which have exploited their land have vanished; for good soil is a heritage that can easily be dissipated and is not easily renewed.

The purpose of my brief discussion in advance of that great leader in the field of soil conservation, Dr. Bennett, is to summarize the development of this cooperative work in Maryland since enactment in 1937 of the Maryland law providing a constructive approach to this vital problem.

The two chief problems confronting Maryland farmers are (1) the control of soil erosion, which annually carries off a heavy toll of top soil, and (2) the drainage of large areas of water-logged farm land chiefly on the Eastern Shore and to a less extent in Southern Maryland. Involved in the solution of these problems is the right classification of farm lands so that they may be put to their proper and economical uses, whether for tillage, pasturage or woodland.

The details of the program require technical instruction and demonstration in contour plowing, strip cropping, construction and maintenance of terraces, and sound cropping practices to control sheet erosion; and the use of draglines, tractors and terracing machines in solving drainage problems. Without such facilities, technical advice and assistance, the farmers would be helpless in attacking these problems.

The Soil Conservation program is an educational and demonstrational program and, hence, is closely tied in with the Extension Service, which

contributes technical advice and assistance in matters involving engineering and cropping and rotation practices. In order to bring about a general consciousness of the serious nature of the erosion problem, meetings are held, demonstrations on farms are arranged, tours are conducted, and news stories regarding such activities are published in the local and metropolitan press.

As the farmers in a community develop interest in the soil conservation program, by their own voluntary action they organize into Soil Conservation Districts, under the State Law designed to facilitate such organization. Thus, the problems of soil conservation are attacked on an area basis. Because the erosion problems of the area included in the Conservation District are alike in character, the project becomes a community undertaking, with all of the interest, enthusiasm and support of the farm people in the community behind it.

Thus the Soil Conservation program is a continuous program, operating every week in the year, and is planned to achieve specific objectives on each particular farm. It does not involve, nor does it require, payments to farmers; though Federal and State funds are essential to provide technical personnel and equipment to make the program effective. It makes farmers conscious of the losses involved in wrongful soil management practices, and assists them to help themselves and their neighbors in stopping the losses and in the adoption of sound methods of land utilization. It aims to conserve soil fertility as a heritage for future generations of farm people.

The Soil Conservation program usually develops into a cooperative project in which the individual farmers, the local tax-ditch associations, the soil conservation districts, the Extension Service, the County, State and Federal Governments all play their respective parts. In the clearing or construction of giant drainage ditches with the necessary laterals and tributaries, designed to drain portions of several counties, the draglines, tractors, and the technical and other labor are supplied by County, State and Federal Funds. The drainage of the individual farmer's land is accomplished through cooperation of the farmers with the local tax ditch association, the Soil Conservation district and the County Governments.

More than three-fourths of Maryland's farm land lies within the boundaries of the 16 soil conservation districts organized by farmers since 1937. These districts are legal subdivisions of the state voted into being by farmers under the terms of the Maryland law. A board of local farmers, the majority of them elected by their neighbors, run the affairs of each district. Through them, farmers in the districts are finding needed

technical help, equipment, materials and funds from state, federal and local agencies, and from private sources as well. The Maryland law provided for a State Soil Conservation Committee to help farmers organize their districts and give them assistance in meeting various problems of land use, which a given district, alone, could not settle. The members of this Committee, as written in the law are:

The Director of the Maryland Agricultural Extension Service
The State Forester
The Director of the Maryland Agricultural Experiment Station
The Chairman of the State Board of Agriculture
The State Conservationist for the U. S. Soil Conservation Service.

These representatives serve without compensation except through the positions they hold. Likewise our soil district supervisors serve without compensation.

We are receiving splendid cooperation from the U. S. Soil Conservation Service. The Federal Department recognizes the importance of working with local agencies and is willing to cooperate with state officials in formulating policies to be pursued. I here want to express publicly to Dr. Bennett and his associates our appreciation for warm cooperation and assistance; also to Mr. Ed. Davis, their able representative in this state.

Most of the job of preserving Maryland's soil, water and forest resources lies ahead, but farmers have already proved it is not an impossible task. Since 1935, for instance, farmers have adopted erosion control methods on over 150,000 acres. They have made plans for improved forest and wildlife conditions on over 20,000 acres and have used modern drainage methods to benefit 400,000 acres of good land. Altogether, about 3,000 farmers have adopted soil conservation programs on their farms. Complete soil, slope and land use surveys have been made on approximately 2 million acres. They show how farm, field and woodland can best be used.

In addition to the above, the Agricultural Adjustment Administration has rendered assistance over the past few years in carrying out the conservation program and improvement of the land by furnishing lime and fertilizer and encouraging the use of conservation practices through benefit payments to farmers. It must be clearly understood by the public that this program is distinctly separate in its administration from our state conservation program. Those so called conservation payments originated in an effort of the AAA to adjust production to demand requirements. At present time these "conservation" payments are made to farmers who comply with certain quotas or goals in the production of war food and fiber requirements.

Only a beginning has been made. Already erosion has caused appreciable depletion of the topsoil on most of the sloping farmland in Maryland. Some 450,000 acres have actually lost more than three-fourths of their topsoil. Furthermore, 603,000 acres of otherwise good Maryland land are not producing all the food they should because they are poorly drained. Drainage channels which are supposed to clear them of water have become clogged with silt. The same by-product of farmland erosion also threatens the life of some of our city water supply reservoirs and impairs the value of our harbors.

A preliminary survey as to the needs for making the best use of Maryland soils and at the same time conserving them for future use indicates that some 800,000 acres now farmed in square fields should be changed to contour farming. There is need for strip-cropping methods to hold soil and water on about 700,000 of these acres. And terraces would help to protect 350,000 acres of this cropland. There is need for 150 miles of new outlet ditches and rehabilitation of 550 miles of old outlet ditches to adequately drain thousands of acres of good land. Other conservation measures needed include improvement of the grass on some 600,000 acres of pasture land, protection of a larger percentage of the land by use of cover crops, and, of course, wise cutting and management of a million acres of farm woodland.

All of us have a stake in the soil, water, forestry and wildlife resources of our state. If they are used wisely and well, now and in the future, we will all benefit. The tools to do this conservation job are now at hand. Let us make sure that they do not lie idle.

This is the work of the State Soil Conservation Committee in cooperation with associated agencies. In the beginning, God created the earth—it is our solemn duty to preserve it.

Soil Conservation In America

HUGH H. BENNETT
Chief, U. S. Soil Conservation Service

It is well to remember in the beginning, that the sooner we do the job that I am going to discuss, the easier and the less expensive it will be to complete; because every day a lot of good productive land is getting away from us throughout the length and breadth of this country as a result of failure to protect it from erosion. Furthermore, it is easier to farm by utilizing the measures which protect land from erosion than it is to farm in the old wasteful way of allowing soil to run off into the rivers and oceans.

There are a number of things that most people don't quite know enough about. For example, city people have told me that they have acquired the habit of running down to the corner grocery store to get groceries until they have come to believe that groceries are produced on the shelves of the corner grocery store.

One of the facts we need to realize at the outset, in order to get ourselves properly oriented, is that food comes from productive land, and from nowhere else. Even the fish in the ocean, to a considerable degree, live on materials that come from the land directly and indirectly; and people should know that around the world not only is land scarce, but it is getting scarcer.

We are not guessing; because we have made a reconnaissance survey of the world. We sent Dr. Lowdermilk, Assistant Chief of our organization, into the Near East, to the country known as the cradle of the human race, to find out what had happened to the land as a result of man's use of it across the centuries.

Dr. Lowdermilk brought back a pitiful story. He found that land is gone from vast areas, not just the topsoil, but the topsoil and the subsoil, down to bedrock, which of course means the end so far as growing things are concerned. And with the land, the people, too, are gone.

In the one area in Syria of only a million and a quarter acres, Lowdermilk found the ruins of about 400 towns and cities, the very names of which are lost to the people of the world.

Here in the United States we hold the world's record for the rate at which productive soil has been permitted to get away from us, and we don't have any too much good land left. But, if we take care of what we have, we will be all right; and I know we are going to take care of it, because it is the only one of our natural resources without which we

cannot possibly get along. This nation cannot possibly survive the downfall of its productive land.

Here is something you may not know because it is not in any book and unfortunately, you weren't taught it in any school. In the beginning we had so much productive land, that folks thought it was inexhaustible. They thought they never would have use for it all. But we have whittled it down to the remaining area of 460 million acres of really good land. That's all we have!

We could plow up some of our pasture, to be sure, and plant it to crops, but we need the pasture to produce butter and milk. We could cut down a few more trees but we need the lumber. In fact, we are terribly short of lumber right now. About 40 million acres of our present cropland needs to be converted into forest or grass, because we can't save the soil if we continue to cultivate it. Yes, 460 million acres of land is all we have of good land, counting that in use now and what we can bring into use with reasonable measure of drainage and irrigation.

But the particular point about this is that most of that 460 million acres is subject to precisely the same degree of degradation—exhaustion or depletion—as the land that has already been ruined. How many people really know how much land in the United States has been ruined for any further cultivation? The answer is: 100 million acres, and in a mighty short time, too. That's a lot of land! It exceeds the combined extent of the New England States, New York, Pennsylvania, and Maryland. It's gone now and has no further practical use for really good cultivation. A great deal of it you can't even walk over, it is so gullied.

But we haven't stopped there. We have nearly stripped the topsoil off a second 100 million acres of land—and we haven't stopped there: this same process of erosion is under way on a third 100 million acres of cropland, making a total of 300 million acres of land ruined, severely damaged, or eroding!

Here's another thing you don't read about in many books: when soil is gone, farm land is finished. I've been over nearly every county in this country, and I know what is taking place. I have also been in foreign countries. For years I've been studying conditions on the land with respect to agriculture and what has happened to it.

I have never yet seen a farmer load soil that has washed no further than from the upper to the lower side of his field on a wheelbarrow, truck, or wagon and haul it back where it came from. So, when soil has washed no farther than 100 feet, 200, 300, or 1,000 feet, we might as well consider it lost, just as much as if it were consumed by fire.

Soil washed into oceans, of course, cannot be brought back. Some people think that after the topsoil has washed off, we can go right ahead and use the subsoil, but we can't—not in many places, even though we can get along fairly well on some types of subsoil, like much of that in Maryland.

I don't want to spend too much time on the evils of soil erosion; instead, I'd rather stress the program that is going to stop the thing, if it gets proper support of everybody in this nation. City people might as well know that up to now, one farm family has been taking care of the food and fiber needs of four city families. But if his soil washes away, a farmer won't be able to take care of even one city family. It will be all he can do to look after his own family, provided he has enough soil left between the gullies to take care of them.

Last year, down in southern Maryland, at first hand, I saw machines taking silt out of ditches which I was told were dug during the Revolution. After drainage on most of these plantations, the land was put back in cultivation, although it had been too wet for cultivation in 1942. That is one example of what conservation does.

Soil conservation districts, to my mind, represent the greatest movement with respect to the welfare of the land and people who live by the land that has ever come out of man's mind since the world was created. I don't ask you to take my word for it, just go out into some of the districts and talk with the farmers themselves. If they have time, they will be glad to show you what they are doing and they will tell you of the results they have obtained.

These soil conservation districts bring together the farmers of communities so they can work together. Thus, a great deal was accomplished last year. I want to make it clear though that the Soil Conservation Service has no rights or prerogatives whatever in soil conservation districts except as rights are granted by the districts. Thus, the job is in the hands of the farmers. It's under local control now—not merely local control, but local farmer control—and that's the way it should be. After all, the farmer is the one to put corrective measures on his own land, to protect it. But he needs and asks for assistance, and that's what the Soil Conservation Service, in cooperation with State agencies, is providing.

Twenty-eight hundred and eight of our men have gone into the military services and twenty of them will never come back. They are now offering and giving their lives—many of them—to protect the United States from those enemies who would destroy us as through war. These same men, before going into the military service to fight with guns were fighting for

the preservation of the nation by protecting its indispensable productive lands from the destroying effects of erosion.

We have lost in addition to those men, the services of more than 3,000 other employees. We were able to make some replacements, to be sure, but to our amazement last year, in spite of the manpower shortage and the shortage of machinery and gasoline, we did a third more work than we ever did in one year before. This was possible because of the concerted action of farmers working together in soil conservation districts.

Sixteen of twenty-three Maryland counties are in soil conservation districts, including 4,772,000 acres. There are 1,070 of these districts in the United States, in which some 2,694,000 farmers live on about 598 million acres of land.

When the Act was first proposed, about 6 years ago, the States considered a suggestive or sample plan drawn up with respect to their needs for some such instrument as soil conservation districts. At that time, I thought if four or five states should pass such an act in four or five years, we would be getting off to a fairly good start. But forty-five states passed soil conservation acts in four or five years—all of the states except Massachusetts, Connecticut, and New Hampshire.

I notice this Forum put soil first on its program. Dr. Symons started out with it and I am continuing with it. You are discussing the conservation of soil, water, trees, wildlife, oysters, fish, game, minerals, parks, roadsides, and boys and girls, too. The welfare of the soil is basic to all human activities, and by working together we can go ahead and get the job done through the soil conservation districts.

Here is an example of what soil conservation districts are doing. This comes from the Ocmulgee River Soil Conservation District. What a name, and what a job they are doing! The members and supervisors in the districts don't get any pay, which is a good thing, and a pretty fair guarantee that the offices won't be political. As long as there are no salaries involved and the farmers elect their own supervisors, the districts are likely to remain under farmer control.

The conservation movement is not only rolling along, but it is gathering speed as it goes. The *Times and Democrat* of Orangeburg, South Carolina recently ran an announcement that the South Carolina Bankers Association and merchants selling lumber, fertilizer, oil for tractors and so on, have put up $290 as prizes for soil conservation. The same thing is being done in scores of districts in that region.

The State Conservation Committee here in Maryland has put out a splendid printed program of its work and the West Virginia Committee

printed its booklet under the name "We Defend." Here is a copy of it, and I advise you get one and read it. Limestone County District in Texas put a program out with about 74 pages of good material that ought to be put in schools. A lot more conservation material ought to be in the schools just as quickly as we can get it there.

The Clarksburg, West Virginia district is looking ahead to the postwar period in their program. It was printed at the expense of the farmers themselves and is well illustrated. They have a splendid plan for putting men to useful work when they come back from our victorious armies. These farmers know just how much equipment they will need, how many horses and bulldozers, how many tractors and shovels, how much lumber, lime, explosives for blowing out stumps, and how many young trees. They want, for example, 8,706,000 shrubs and 6,720,000 trees in that one district. We will have nurseries to help them; and some of the districts are already setting up their own nurseries.

Our Service bulletins are playing an important part too. We are not letting the districts do everything. The Soil Conservation Service has a bulletin on almost any soil conservation subject you want to read about. All you have to do to get one is to write me and I will send it to you.

We don't know it all yet, but we know a lot more than we did in the beginning. We have made mistakes, but we have made more successes than mistakes. Somehow we have managed to get soil conservation completed on approximately 70 million acres of land in the United States. That's considerable, but counting the grazing land of the West which is subject to erosion, and pasture land, we still have about 860 million acres of land which need treatment, and we are going to try to treat it.

After ten years we have finished only about ten percent of the overall job; mathematically, that leaves ninety years to go. But this is one time arithmetic does not tell the whole truth, because conservation is getting into the bloodstream of farmers. Work is proceeding at an ever-faster pace, and it is going to go faster and mean more. I have already told you how.

Dr. Lowdermilk recently returned from China where he went at the request of the Chinese Government to help get a soil conservation program started. Soil conservation is spreading around the world. In the United States we have risen rapidly from the position of being the greatest soil wasters in the world to that of the greatest soil conservers in the world. Why, just before I left Washington, the Chief of the Soil Conservation Service of Mexico was talking to the Chief of the Soil Conservation Service of the United State Department of Agriculture about

an invitation the latter had just received from the Chief of the Soil Conservation Service of Kenya Colony, Africa, to come over and see what they were doing.

Now let's talk about your neighboring State of Pennsylvania. It hasn't been but about 10 years since I was asked to come to Pennsylvania State College of Agriculture to talk on the question of whether or not they had an erosion problem in Pennsylvania. That's an illustration of how the problem of erosion has been so generally neglected.

Here's one of the reasons we get into difficulty. I have already told you about our early idea of the abundance of land. Well, our country was made round. All the hills and valleys are round. Yet for years Americans have been applying to that round topography a straight-line agriculture, which means that most of our crop rows run uphill on one side of the hill and down hill on the other side. This invites accelerated erosion. We have measured the rates and we know how very much faster it is going.

Lots of destruction takes place when corn rows run downhill concentrating the rainfall into little gutters between. We learned nearly two centuries ago that the greater the depth of water in a conduit, the faster the water runs; and the faster it runs the more soil it picks up and carries off. If you double the velocity of the water you don't just increase its carrying capacity twice, or four times or eight, sixteen, or thirty-two times, but sixty-four times! That is what happens theoretically or in a laboratory, where you can control everything except gravity and friction.

That's how soil is getting away from us under careless farming. Instead of having a square or straight-line agriculture in a round country, our farming measures must be fitted to the shape of the land as you would fit a good-looking dress to the rounded figure of a good-looking woman. You must plow on the level—the contour—no matter how crooked the rows may run.

Up in Lancaster County, Pennsylvania, they are fitting their cultivation to the land as you see in this photograph. The only possible way to control erosion is to treat the land according to its characteristics, according to its capabilities as imposed upon the land by Nature. We can't change natural law, no matter what we do. Also, we've got to treat land according to the needs of the land as brought about by changes induced by man's use of his fields and pasture.

Take Nodaway County in northwestern Missouri. A lot of people once contended it was the best agricultural county in the United States, but farmers overlooked the needs of their base—their starting point, the productive soil—and they have allowed a good many slopes to wash

down to a miserable clay subsoil that cracks when it dries and swells and sheds water like a tin roof when it is wet. This picture which I took there some years ago, shows such a slope.

You will always see muddy water running off sloping, unprotected fields, no matter what part of the world you go to. Every time it rains, a thin sheet of soil runs off in the water that runs off the land, if it is not duly protected. We call it muddy water, forget it, and let it go on down to streams that used to be clear in virgin days when we had dense forests and grasslands. You never see muddy water flowing from well-wooded or densely grassed areas. When the soil is gone, you can't get it back. You can't grow anything on rich topsoil resting on the bottom of a reservoir, river, or ocean.

The best we have been able to do on stiff dry subsoil like the picture I showed you, after growing a crop of sweet clover and adding lime, is to raise about 25 to 30 bushels of corn. But you spend two years getting that corn, so the real yield is only around 15 bushels per acre.

We went out to Walter Scott's farm yesterday, over in Harford County. It was a beautiful sight. Going there, we saw a lot of erosion along the road as the result of recent rains. We didn't see any erosion on Scott's place of 182 acres. He said he didn't have any. I asked him if he ever had any. He replied, "Lord, yes, plenty of it, and a lot of gutters too." He calls gullies, gutters. I didn't know you Marylanders did that. "The rain just tore gutters through my place," said Scott.

"And now you don't have it any more?" I asked.

Scott replied, "No, this work which we have done—the terracing, contouring, strip cropping, and the new rotation—has stopped it."

I asked, "What else has it done for you?"

"Well, we have done this kind of work now for five years," he told me. "Just before we started it, we had about as good a year as we ever had for corn, and I had the same varieties and treated them about the same way, except we didn't practice soil conservation. I was running the rows up and down the hill; and I made 45 bushels of corn off this field we are looking at. Recently I made in a good year—not last year, that was too dry, but year-before last—65 bushels of corn on that land."

We have just had returns from over 9,000 typical farms throughout the United States; from farmers who have practiced conservation for two years or more. Most of them have treated their croplands, their pasture lands, and their woodlands. Their average increases in per-acre yields has amounted to 33⅓ percent throughout the United States, including practically every kind of crop we grow—and under every type of agriculture

and on practically all kinds of land, and for varying types of climate. Figure out what that means. If we should get only 20 percent increase, it would mean the addition to our food production capacity of about one million farms without actually adding a single acre of farm land.

One of the simpler soil-saving practices is cultivating on the contour. Each little ridge is a dam and the depression between acts as a reservoir to hold rainfall and store it in the ground. Why was it that it took us so long to find out that the greatest reservoir outside of the ocean is the soil itself? We are trying to utilize that reservoir now. But we have allowed 2,000 of our smaller reservoirs of various sizes, to fill up almost to the tops of their dams with the products of erosion, washed from the fields to a large extent, and overgrazed pastures. About 25 percent of our remaining reservoirs are subject to the same process. They will be filled, at the present rate of silting, in less than fifty years.

Baltimore has had some difficulties with the silting of its reservoirs. I can't give you the details because I don't remember all of them at the moment. Out at the new Brighton Reservoir, they have cut some holes down near the bottom of the dam to allow muddy water to pass out of the reservoir. When muddy water enters a reservoir, it sinks because the mud makes it heavier than clear water. So, it goes to the bottom and retains its identity for a considerable time. The mud stays in suspension and if we have a hole there, we can draw off the muddy stratum of water. Of course, the proper way to maintain reservoir storage capacity is to control erosion up on the watershed.

In New Hampshire, one of the states that doesn't have a soil conservation district, increased yields as the result of conservation paid for all the erosion control work with one crop of potatoes. A lot of people said you can't use modern machinery on crooked contoured potato rows, fitted to the form of the land; but Mr. R. M. Johnson, of Walpole, New Hampsire does his cultivating that way and he is one of New Hampshire's best potato growers. I would put him up against any other potato grower in that State for efficiency of production.

Sand storms are not all confined to the Great Plains; sand storms occur in Maryland, too—and in New Jersey. Snow fences are pretty good for keeping sandy soil from blowing, but trees, rows of trees or shrubs, are even better. In the eastern part of the United States—around Charleston, over in New Jersey, up on Long Island—and in many parts of the country, trees and shrubs are being planted to stop soil erosion by wind.

A lot of land shaded by trees won't grow any of the ordinary crops and frequently a gully develops in such a place. Probably the trees take

a lot of plant food and moisture from the soil and most plants fail in such situations.

But the lespedezas will grow in these places. These plants thrive in such locations. *Lespedeza bicolor* is very good for these border situations. It affords protection for quail, and they like the seed probably better than anything else. Some fifty-odd were taken recently in Rock Hill, South Carolina. Those quail had eaten more *Lespedeza bicolor* than they had of twenty other plants producing bobwhite feed. Incidentally, *Lespedeza bicolor* is producing a brand new variety of honey, and I am one of the few people fortunate on earth who has tasted it. This particular honey is a by-product of soil and wildlife conservation.

I have a picture here, an air view showing conservation work being carried on 174 adjoining farms in Bell County, Texas, encompassing 34,000 acres. These farms are operated by farmers of various origins. The parents of many of them came from Austria, Russia, France, England, and Scotland. On this project they have all worked together admirably. Instead of having two ditches where farms join, to take the water safely downhill, one man puts up half of the land for the ditch and the other puts up the other half, and they have entered into an agreement to maintain such ditches permanently. They have done the same thing with respect to terracing that crosses farm boundaries.

These people, cooperating in a fine way, have done a fine job of conservation and that kind of thing is the reason people are coming here to America from all over the world to see what we are doing. These Texas farmers, mostly of foreign origin, were the first to go over the top with the scrap iron drive; they were also the first to go over the top with the aluminum scrap drive, and the first to go over the top in this great agricultural county with the purchase of bonds for prosecuting this war—in many instances against land of birth of their parents. There never was any better cooperation.

What is responsible for such patriotic cooperation? There is something in the productive soil without which we can't even survive, that influences men deeply.

Today, one thousand nine hundred and forty-four years after the birth of Christ, we have on our hands the worst of all wars. Somewhere along the line our great scientists, our educators, our preachers, our lawyers, our legislators, and our statesmen have all missed something. I think we have missed the thing out of which we might have peace around the world. I think if people could have the food they need we would have less cause for international hatreds. It's hungry people who make fertile

ground for dictators to sow their venomous poison. Soil conservation, I think, could make a lot of land around the world produce more—and that, I am convinced, would lessen hunger and want and mad desire to take what is denied these people, not necessarily by lack of resources, but by inefficient use of the land.

Conservation of Maryland's Mineral Resources

JOSEPH T. SINGEWALD, JR.
Department of Geology, Mines and Water Resources
Director

The people of the United States were long fortunate in having an expansible frontier beyond which were vast virgin natural resources. There was no consciousness of measurable limits to natural resources. But even while the frontier was still expanding, scientists became conscious of the existence of limits to our natural resources and of the need to conserve them. A popular conservation movement was first formally inaugurated by President Theodore Roosevelt in 1908, at the notable White House Conference, which resulted in the appointment of a National Conservation Commission. Even Congress had not yet become aware of the necessity of conserving our natural resources. It denied the National Conservation Commission a modest appropriation of $25,000.00, and prohibited the scientific bureaus of the Federal government to do work for the Commission. Despite this discouragement, the crusade was continued, and among the most prominent and able of these crusaders was Charles R. Van Hise, head of the department of geology of the University of Wisconsin, who in 1910 published the conservation classic entitled "The Conservation of Natural Resources in the United States."

In the ensuing years, soil conservation and forest conservation made much headway; but it was not until the requirements of World War I brought forcibly to public attention the incompleteness and the limitations of our mineral supplies, that much conservation was made in the domain of mineral resources. Under the auspices of the War Industries Board, our mineral resources and their inadequacies were thoroughly inventoried for the first time. The far greater demands for mineral products of the present, much more highly mechanized, war have focused attention again on the limitations of our mineral supplies; and they again have been even more intensely and thoroughly inventoried by various federal war agencies. These appraisals point unmistakably to the urgent need to utilize without waste and to conserve wisely our mineral resources.

Those who remain blind to the measurable limits of our mineral resources fail to grasp the import of two very significant statistical facts: (1) the peak of our participation in the mineral production of the world was reached prior to World War I when the United States pro-

duced more than ⅓ of the world output; whereas at the beginning of the present war our portion had dropped to nearly ¼ of the world output; (2) during the quarter century between the two wars, our per capita consumption of mineral products had doubled. Yet in the domain of mineral resources we are dealing with irreplaceable resources.

Man can renew and restore soil, no matter how impoverished or even eroded it may be. Man can replant and regrow a forest, no matter how greatly it may have been devastated. Unless a form of land or water life has been depleted to the extermination of the last pair, man can propagate and restore to former abundance most forms of wild life. Conservation has not only conserved but has also worked wonders in restoration in these domains. But man cannot restore and replenish mineral resources. Once removed from where they were deposited by nature, they are gone forever. However, a conservation policy predicated upon present deprivation to insure future adequacy would be unduly onerous to the present, and would fail of popular support. On the other hand, this unique nature of mineral resources does place upon us all the greater responsibility to practice conservation in the wise use and avoidance of waste of our mineral resources.

Mineral Products of Maryland

Mineral products are the basis of the equipment and of the motive power of modern industrial life. When that life runs smoothly under peace-time conditions, the layman is hardly aware of his dependence on mineral resources. It is only under catastrophic conditions, such as the present war, when production suddenly falls short of augmented demand, that the layman becomes really aware of the extent to which not only his well-being but his very existence is dependent on mineral resources. Not only has our consumption of mineral products increased geometrically, but the variety of mineral products needed has increased at an even greater rate. The list of mineral products classed as *essential* to our war effort greatly exceeds 100.

Mineral products are generally divided into four major groups: (1) Metals; (2) Non-metals; (3) Fuels; (4) Water.

METALS:

Except for a small, intermittent gold production in Montgomery County, Maryland has produced no metals in recent years. Iron mines were formerly operated in many parts of the State, but the deposits are too small to be profitably mined now. A hundred years ago Maryland was the leading chrome producing state from deposits in Baltimore, Harford and Cecil counties. These mines have long been idle. Only one small

manganese deposit has been worked. Numerous deposits of copper, lead and zinc occur in central Maryland, but they have been abandoned long since. The Bare Hills copper mine is credited with a production of over $1,000,000. No aluminum or magnesium ores have been produced, but the aluminum industry is on the threshold of utilizing clays and magnesium is produced from limestone and sea water, raw materials abundantly available in Maryland. Small unworkable occurrences are known of such minor metals as titanium, beryllium and uranium.

NON-METALLIC MINERALS:

The mineral production of Maryland comprises the non-metallic minerals. The building materials include building, roofing, and crushed stone, cement and lime, produced mainly in central Maryland; and sand and gravel produced mainly in the Chesapeake Bay region. The refractory and ceramic minerals are high-grade fireclays in Allegany and Garrett Counties, and brick and tile clays abundant throughout the State. The feldspar industry, once very active, is now dormant. The most productive industrial minerals are talc and soapstone produced in Harford and Carroll counties. Diatomaceous earth, glass sand, mica, and abestos are produced on a small scale. Except for the recovery of by-product potash and the former use of greensands for their potash content, Maryland has not produced fertilizer minerals. Quartz, used as an abrasive under the name "flint," was at one time actively worked in Harford and Baltimore counties, but present production is small. The evaporites, salts and brines, are not found in Maryland. Gem stones are not produced in Maryland.

FUELS:

The fuels comprise coal, oil, and gas. Oil and gas have not been produced in Maryland. At present some of the major oil companies are leasing large acreages in Worcester and adjoining counties, and a real test of the petroleum possibilities of the Eastern Shore is at hand. Coal mining is the most importatnt mineral industry in the state.

WATER:

Water is the most widely used and most widely distributed mineral resource, differing from the others in being a replenishable resource. Water was long regarded as an unlimited resource that could be drawn upon at will by whoever chose. Communities and large industries have become painfully aware of the fallacy of this assumption. Farmers and foresters have become aware of the need for conservation and protection of water resources.

Maryland is well endowed with surface water resources. Eastern Maryland is rich in ground water resources. The ground water resources of Central and Western Maryland are more limited.

Value of Maryland Mineral Production

The value of the annual mineral production of Maryland is of the order of $15,000,000. In 1942, the coal production had a value of over $5,000,000; sand and gravel over $5,000,000; cement over $3,000,000; crushed stone and building stone nearly $2,000,000; lime nearly $500,000; clay over $100,000; talc and soapstone over $100,000. The remaining minerals have much smaller annual productions.

No attempt has been made to evaluate the water utilized in Maryland. Solely in terms of production cost, its value would greatly exceed the value of all other mineral products. The value of the water production of Baltimore City alone would exceed $5,000,000 annually.

Immediate Mineral Conservation Problems in Maryland

The most pressing conservation problems in Maryland concern coal resources and water resources.

COAL:

Coal mining affords an excellent example of the complexity of conservation problems in mineral resources. Three-fifths of the coal production of Maryland comes from the Georges Creek basin in Allegany County. Nearly half of the coal production of this basin comes from a single coal seam, the Big Vein, one of the most valuable coal seams in the United States. All of the acreage of this coal has been developed. Initial mining recovered but 50% of the coal. Present production is derived entirely from pillars left in the old mine workings. Much of this pillar coal is in such condition that it cannot be recovered. Records of old workings have not been preserved, so that the locations of areas of otherwise recoverable coal are unknown. When mining in this valuable seam of coal ceases, 20% to 25% of the coal will be left in the ground, unrecoverable and lost forever. Had there been conservation consciousness during the 100 years that this seam was being developed, the ultimate recovery would have been greater than is now possible. The future of Frostburg and the many smaller communities in the Georges Creek basin depends on the extent to which the waning output from the Big Vein can be compensated for by increasing production from thinner and lower grade underlying seams.

WATER:

The flow of streams fluctuates enormously, ranging from the minimum drought flow to the maximum flood flow. The minimum drought flow of many streams is much less than the requirements of communities and industries dependent on them. The maximum flood flow is much greater than those requirements, and the excess goes to waste. Conservation of the water resources of streams is achieved with impounding reservoirs that store up the otherwise wasted excess flow and utilize it at times of deficient flow.

That underground water resources are not inexhaustible and not unlimited in quantity is learned empirically by farmers during periods of drought when the flows of springs diminish and wells go dry.

In the portion of Maryland that lies southeast of a line joining Havre de Grace, Baltimore, and Washington, a region known as the Coastal Plain, are abundant and valuable ground water resources. Most of the largest industries in the Baltimore industrial area depend on these underground waters for their water supply. The daily production of ground water from wells in this restricted area is 50,000,000 gallons, about ¼ as much water as is furnished daily by the Baltimore City water supply. If this volume of water were purchased from the City of Baltimore, it would cost over $1,000,000 annually. This ground water supply has been drawn upon indiscriminately without regard to its rate of replenishment. Excessive pumping has lowered the water level as much as 100 feet in places. Wells have not been properly protected against infiltration of contaminated water, which locally has entered the aquifers and impaired the quality and purity of the water. The peril of impoverishment and contamination of these waters through their unrestrained utilization has long been known. The increased demands of the immensely expanded war industries made this problem so acute that an intensive investigation of these water resources was initiated a year ago. When the rate of withdrawal does not exceed the safe yield, the permanency of ground water supplies is assured.

Conservation Responsibility

Conservation can be achieved only to the extent to which the people as a whole are conservation minded enough to demand and support it. The efforts of the specialists in the various domains of natural resources are little more effective than "voices crying in the wilderness" unless their voices are heard and heeded by the people. The author of a small pamphlet entitled "Ethics of Conservation" very picturesquely phrased our responsibility as an ethical obligation in these words:

"More important to conservation than government action is a reformed public opinion. Only when men come to feel that it is immoral to waste the resources of nature will civilization be secure. May the day be not far distant when such acts will be regarded as we regard larceny, drunkenness and debauchery, and when the doers of them will be excluded from the society of all self-respecting people."

Recent Developments In Maryland Forestry

JOSEPH F. KAYLOR
State Forester of Maryland

This opportunity to tell of recent developments in Maryland relative to forest conservation is welcomed because in the last few years real, even striking, progress has been made. It has been made, let me say, through the wholehearted cooperation of the legislative and executive branches of the State government, of the Federal Forest Service, and of the many citizens of Maryland who believe in the wise use of what, in capital value, constitutes our greatest renewable natural resource. On behalf of the those public agencies charged with the protection and development of our forests—the Department of State Forests and Parks—I make grateful acknowledgment of the debt incurred.

The greatest single step forward in forest conservation since the creation of the original Board of Forestry in 1906 was taken when the Legislature of 1943 passed the Forestry Conservancy Districts Act. The need for such legislation is plain enough, though it remains a fact that, alone among Eastern States, Maryland has acted to meet this need. Without doubt, other States will, before long, follow suit, but my belief is that in the future, when scientific management, like scientific farming now, is taken as a matter of course, our own State will be singled out as the pioneer in sound forest practice.

To all those interested in the welfare of the people of Maryland it is a disturbing fact that our timber stands, as the result of long misuse and damage by fire, insects, and disease, now produce, through natural growth, considerably less than one-half the amount of wood that, acre for acre, they could produce under proper management. And this in a State ideally situated for the rapid growth and ready sale of forest products! Each successive cut into our forest capital has resulted in smaller timber and less valuable re-growth. A recent survey shows that of our 2,230,000 acres of woodland, only about 300,000 acres, or 13 per cent, can be classed as sawtimber areas, while 1,125,000 acres, or 53 per cent, produce nothing better than cordwood. The remaining areas, or 34 per cent, are either restocking to tree growth, though in few cases satisfactorily, or else have been so badly denuded of such growth as to constitute waste land. If we choose to include in our calculations, as potential woodlands, some 300,000 acres of other waste land, represented mainly by abandoned farms, we get

even lower percentage figures for sawtimber and cordwood areas than those just given.

It was this situation that convinced Governor O'Conor and the Legislature that steps must be taken to restore our timber stands to productiveness, and so ensure a permanent source of raw materials for our wood-using industries and of revenue for the State's landowners. One other factor played a part in this decision. It was the realization, brought home to us by the public utterances of the Chief of the United States Forest Service that if we failed to make reasonable provision for proper management of our timber stands, with a present estimated total stumpage value of $50,000,000 and a potential value two or three times this amount, the federal government might well step in and do the job for us.

Now, we of the Maryland Free State, when the need arises to put some part of our house in order, prefer to do the job ourselves, in our own way. Federal participation in our forest conservation program is at all times welcome. It has been of immense assistance to the Department of State Forests and Parks, in that it has placed at our disposal funds for personnel, tools and equipment vitally needed in forest fire control. I shall have more to say about this presently. As a citizen of the Free State, however, I want to emphasize here that federal participation is one thing, federal control quite another. For this reason I feel sure that you will agree with me that, in the Forest Conservancy Districts Act, we are fortunate to secure, at one and the same time, a progressive piece of forest legislation and a chance to demonstrate that the State of Maryland is able to manage its own affairs. This is the democratic way in which to meet the problem.

The time at my disposal does not permit me to discuss the Forest Conservancy Districts Act in detail. Enough to say here that under its provisions the Commission of State Forests and Parks has established common-sense rules of forest practice on privately owned timberlands throughout the State, designed, among other things, to ensure a permanent growing stock of healthy young trees of the more valuable species; to improve the timber stand by periodic thinnings, the products of which will be utilized for fuelwood, pulpwood, mine timbers, and the like; and to provide means for the prevention of forest fires. These and other regulations of the Commission which, all told, number only seven, will be put into effect by district forestry boards, made up of representative local residents. Administration of the Act itself is placed with the State Forester.

At this point I want to say, unequivocally, that it is not the intention to force upon landowners, willy-nilly, practices the reasons for which they

may not understand. My instructions from the Commission of State Forests and Parks are that adherence to the law shall be brought about primarily by education. Only when prolonged and patient effort fails to achieve results will other means be invoked. So clearly are the regulations of the Commission in the interest of the landowner that in most cases little or no education should be needed. These regulations do bar timber operators, that is to say, millmen, from the kind of cutting, all too frequent in the past, which leaves the land practically worthless so far as the owner is concerned. Under the regulations, he is protected against this contingency. And I have reason to believe that the great majority of progressive millmen, who want more than anything else a permanent source of timber supply, will cooperate wholeheartedly in the administration of the law. They are good citizens, and my firm conviction is that they will will lend their aid in a worthy cause when the way is pointed out to them. Many have already done so.

Another development in Maryland forestry to which I think your attention should be called is the recent increase in effectiveness of the fire control organization of the Department of State Forests and Parks, brought about, as previously said, by the expenditure of emergency funds allotted to it by the United States Forest Service. Aside from the additional personnel and ordinary fire tools acquired by such means, we have been able to build up a fleet of motorized, mobile pumper units that, for the area to be covered, is equal, if not superior, to that maintained in any other state. In 1942, we had one such unit. Today we have thirty-seven units of various types, with tank capacities of from 50 to 1,000 gallons, along with twenty "front-end" pumper units and ten portable pumps which operate direct from streams and water holes. For the benefit of the uninitiated, it should be said that a water hole is a shallow well eight feet in depth, lined with two 4-foot sections of concrete culvert pipe, 3 feet in diameter. Such holes are located in places where the ground water level is near the surface, or even in damp spots with good water-holding capacity. They constitute, in fact, rural fire plugs, to provide a water supply for our pumper equipment in places where a natural supply, in the shape of a stream or pond, is not available. We have already developed a number of such holes, and plan eventually for a total of about fifteen hundred throughout the State.

I should go on to say that, aside from its use on forest fires, this equipment really constitutes a rural fire department in areas beyond the range of organized fire companies. In such sections it may, upon call, be employed to extinguish all kinds of fires, including those which originate

in farm buildings. Already a number of farmhouses, barns, and crops have been saved by quick action on the part of members of our field force with their pumper units.

It goes without saying that our fire fighting equipment must be maintained and that we must have the means with which to employ the personnel to operate it. For the next several years at least, the funds which we are likely to receive from the federal government, plus our regular State allotment, will be insufficient for the purpose. We are, however, greatly encouraged by the fact that several of the more heavily forested counties, whose stake in fire control is obvious, have come forward with offers of financial assistance. It means—and this is another source of encouragement—that the fire control job we have done so far has not gone unnoticed in those sections of the State most affected. Even more than this, it ensures coordinated effort in the protection of public and private property on the part of the counties, the State, and the federal government.

There is not at my disposal the time to tell you how the Department provides healthful outdoor recreation for the hundreds of thousands of our people who annually visit our fourteen State forests and parks, or of the exercise of our custodianship of the three million shade trees which line our public highways, or of our woods operations, carried out in accordance with sound principles of forestry, on our 125,000 acres of State forests, from which are obtained wood products useful alike in war and peace. Each of these activities represents conservation in action, a "fait accompli," rather than a pious wish.

Dr. Bennett has just mentioned the sales resistance exhibited by certain farmers in the matter of new and improved methods of crop production. I, for one, welcome such methods wholeheartedly, if for no other reason than that they provide us with corners of fields where trees, supplemented with shrubs, may be planted as a source of farm timber and fuel supply, and game food and shelter.

I want to close my talk with the enunciation of a principle that I think is sound, and that, if followed, offers the greatest chance of success for the whole conservation program. That is, that in the fight for the wise use of our natural resources, as in any other fight, such as the one we wage around the world today, victory can be assured only by a united front on the part of those engaged in it. It will not be won by conservation agencies working at cross purposes, solely for their own particular and "to heck" with the other fellow. In too many cases the work of such agencies is inter-related in one way or another for that sort of thing to

succeed. Complete cooperation between agencies where cooperation is called for is the only sure guarantee of results. It has been and will continue to be, the policy of the Department of State Forests and Parks to cooperate with other conservation agencies, State and federal, in all cases where such cooperation will avoid duplication of effort and ensure a coordinated work program. The record will, I think, show a consistent adherence on our part to this policy.

In return I want to ask something for ourselves. The Department of State Forests and Parks is charged by law with the protection and development of Maryland's forest resources. Upon us will rest sole responsibility for success or failure in this work. In the circumstances, I believe it not too much to ask that other conservation agencies, State and federal, whose activities touch at any point upon forests, forestry, or public recreation in wooded areas, clear such activities, in so far as they relate to Maryland, through the Department of State Forests and Parks. We are out to win the fight for forest conservation and park development, and in a united front we seek the strength to make victory sure.

Federal Participation In Measures For Better Forest Practices

LYLE F. WATTS
Chief, U. S. Forest Service

Maryland Steps Forward in Forestry

In putting its Forest Conservancy Districts Act of 1943 into effect, Maryland is taking a long step forward in forestry. Its progress will be watched closely by other states, by the forestry profession, and by the forest products industries throughout the Nation.

Maryland's law is noteworthy in that it recognizes the need for more positive action to assure better forest practices on private lands, but does not spell out the silvicultural details. It provides for the setting up of district forestry boards and for local participation in promulgation of rules of forest practice which are to have the force of law. This is in line with recommendations made by the Forest Service to the Joint Congressional Committee on Forestry in 1938. While the wording of the Maryland law is somewhat indirect, public regulation is clearly involved. But let's not be carried away by any emotional reaction against regulations as an evil to be resisted.

Under the law, every person owning 3 acres or more of forest land is required to arrange for restocking of his land after cutting, to leave conditions favorable for regrowth, to refrain from cutting immature timber except for stand improvement and to maintain adequate growing stock. Such regulation is not regimentation. It leaves wide latitude for individual initiative. It does not involve taking over any private business. It does no more than establish safeguards to the public interest in proper management of a basic natural resource.

Such a law brings to bear upon forestry a truism enunciated by George Washington in a letter to John Jay in 1782 when he wrote: "Experience has taught us that men will not adopt and carry into execution measures the best calculated for their own good without the intervention of a coercive power." The pertinence of this statement to our discussion is apparent when we consider that in Maryland, under the cooperative plan of offering technical services to private owners that has been in operation for 30 years, only 5 percent of the woodland has been examined as the basis for management plans and only 1 percent has actually been marked for cutting to meet forestry objectives.

Our democracy has not found it inconsistent with basic principles of freedom to exercise regulatory authority in other fields. Compulsory edu-

cation for our youth, for example, has long been recognized as basic to progress in democratic government. Your state forester has emphasized that application of rules of forest practice under the new law will be primarily an educational job. And I think the real significance of public regulation of forest practices is clarified when it is viewed as compulsory education in forestry,—education that holds promise of raising the general level of voluntary and intelligent individual action in forest management to a higher point than actually required by the law.

In the light of widespread concern about the extension of federal activities in the states, I think it is significant that the framers of the Maryland Forest Conservancy Districts Act evidently anticipated and desired federal participation. In fact, it is the duty of the district forestry boards to secure the cooperation and assistance of the United States and any of its agencies as well as the agencies of the State. It is therefore appropriate to discuss what the Federal Government is prepared to do and what the Forest Service thinks it should do to obtain better forest practices on private forest lands throughout the country.

Federal Government Aims to Help Private Owners

At the outset I want to make it perfectly clear that the Department of Agriculture believes that it is sound public policy to make good forest practice attractive to private owners. A major objective of the Department's forest program is to give private owners and operators every reasonable encouragement and aid.

Of fundamental importance in this connection is the comprehensive research at the regional forest experiment stations and the Forest Products Laboratory. For more than 20 years the Forest Service has been building up knowledge of the growth habits of our principal commercial species. This research has provided the essential technical background for methods of cutting that will perpetuate the forest. It has shown the economic advantages of selective cutting. Research at the Forest Products Laboratory opens up new fields in pulp and paper making, wood plastics, and other forms of chemical utilization. It helps wood to compete in older markets by improving its serviceability through timber engineering, seasoning, conditioning and preservation. Research requires long years of persistent effort. It is indispensable to progress in better forest management. It is an invaluable service that private owners as a rule cannot provide for themselves.

The Federal Government is participating in another basic and indispensable service to all forest land owners through cooperative fire pro-

tection. In the last fiscal year, with war emergency funds supplementing regular Clarke-McNary Act allotments, the Federal Government contributed almost $200,000 of the $442,000 expended for forest fire protection in Maryland. Federal cooperation with the States will undoubtedly be substantially increased if S. 45, a bill that passed the Senate last July and is now before the House, is finally enacted.

It is generally recognized that the public interest in adequate protection from fire transcends individual property rights. Forest land owners have long accepted the restrictions imposed by the forest fire laws of the several states. It is worth noting in passing that restrictions on private owners contemplated in the regulation of cutting practices do not differ in principle from those imposed for fire protection.

In service to individual owners, the Federal Government functions through the State in the production and distribution of forest planting stock, in the educational program of the Extension Service, in woodland demonstration projects, and in farm forest marketing projects. The service provided in the marketing projects during the past 2 years is proving particularly effective. The project foresters, working within the limits of an area with which they can become personally familiar, are not only assisting owners in selling their timber crops advantageously, but also are demonstrating methods of cutting which maintain productive growing stock and give stability to their forestry operations. It is probable that these project foresters will play a large part in the application of forest practice rules under the Forest Conservancy District Act, since this act calls for the employment of a forester in each district to advise owners with regard to forest problems.

The Federal Government is giving aid directly to individuals through the Federal Land Banks, through F. S. A. loans and advice, through the complete farm plans furnished by the Soil Conservation Service, and through woodland demonstration projects. Beyond this the Forest Service is prepared to assist the non-farm and industrial owners in the preparation of plans for the management of their forest properties. Furthermore, as a wartime measure, the Forest Service has a number of men working in counties not served by farm forest marketing projects, to stimulate and facilitate the output of lumber and other forest products.

The legislative program advocated by the Forest Service would further encourage good forest management by provision for long-time forest loans and by providing forest insurance at reasonable rates.

In the face of all these aids to private owners it is difficult to rationalize the fears of those who charge that because the Forest Service has advocated

public regulation of forest practices it aims to undermine private forest enterprise. Actually the Forest Service aims to put private forest enterprise on a much sounder and more permanent foundation.

It is encouraging to learn that in Maryland the effort to establish legal standards of forest practice is viewed as an extension of public guidance rather than as an encroachment on individual freedom.

Public Interest in Forest Practices is Nation-wide

George Washington emphasized the necessity for coercive action to get people to adopt measures for their own good. It is important to recognize also that the notion that individual and social aims are always in accord is open to question. Too often the individual is motivated by desire for immediate gain which in the final analysis proves to be at the expense of the community. Exploitation of soil and forests is patently in this category. So, the government must intervene and restrain the individual on behalf of the community.

In this connection I should like to quote from "The Wind Blew from the East" by Ferner Nuhn:

> "Title to a certain piece of earth is one of our more or less useless human fictions. . . . The only true title to things is use, and good use in the long run is good title, while bad use is bad title. We will soon lose what we cannot use well, no matter how sure we are that we own it."

Applying this thought to our forest problem I want to point out that no owner making good use of his land as judged by criteria of good forest practice need feel any encroachment on his title through the type of public regulation proposed by the Forest Service. But I believe that such regulation is a necessity because of widespread and traditional misuse of so much private forest land.

To reiterate oft-quoted facts that must be familiar to most of you: One-sixth of our commercial forest land, some 77 million acres, is essentially unproductive as a result of destructive cutting and fire. A large part of the remaining area is only partially productive. The stand of sawtimber in the United States appears to have been reduced 40 percent in 30 years prior to the war. Depletion of basic growing stocks has not yet been checked on more than a small fraction of the privately owned forest area. Although we have enough forest land to produce timber for all foreseeable needs, if it is properly managed, we probably will have to double the present rate of growth in order to meet future requirements. For annual sawtimber growth is little more than half of wartime drain

and our estimates indicate that total consumption in the years ahead is likely to be even higher than at present if timber is available at prices that people can afford to pay.

Proper forest land use is a matter of national significance with which the Federal Government must be concerned because timber is such an important item in the national economy. The war has shown how vital an abundant timber supply is for national security. Internally, people in the industrial sections of the East and in the sparsely wooded or treeless agricultural areas of the Middle West and Plains States have an interest in the productivity of the major timber-producing States of the South and the far West. The Federal Government cannot evade responsibility for protecting their interests in the permanent timber supply.

And the watersheds of great streams which provide hydroelectric power to turn the wheels of industry or water to irrigate agricultural crops do not conform to state lines. Protection of the forests from destructive cutting is as important as protection from fire. And it is just as important for flood control and the regulation of streamflow as it is for timber production.

This, in brief and only in part, is the basis for my conclusion that the Federal Government must take active leadership in the nation-wide application of measures that will prevent forest destruction, check further forest deterioration and keep forest lands reasonably productive.

Federal Standards of Forest Practice

What I wish to make clear at this point is that I do not believe our national forest problem can be successfully met on the basis of state legislation alone. State programs such as that upon which Maryland has embarked, do not eliminate the need for federal legislation.

In order to assure nation-wide adherence to satisfactory levels of forest practices, the standards for regulation should be established by federal law. This does not mean that the States could not administer forest regulation within their borders in accordance with their own procedures and institutions. But it would mean that the local rules of practice adopted by the States should not fall below the standards set up in the federal law. And the Department of Agriculture should have authority to act directly in any State which failed to enact suitable legislation and enforce adequate rules of practice.

State action in this field should not be delayed by the fact that the federal legislation does not yet exist. Inauguration of a regulatory system takes time. Development of adequate rules of forest practice to meet various local conditions calls for a high level of group thinking. It will

involve a lot of intensive educational effort. States like Maryland that push forward on their own initiative will have a distinct advantage over those that hold off. It may not be possible at the outset to set forest practice at the level which may ultimately be desirable. But it is to be expected that experience will lead to a general improvement in forest operations and a gradual raising of the levels of required practice. Thus States which inaugurate regulation at a very low level may need to strengthen their standards when a federal system comes into operation, while States which have attained high standards may find no amendment necessary. The Maryland law appears to provide a framework sufficiently broad to function effectively within the pattern suggested. Final judgment as to the adequacy of the Maryland program must, of course, wait upon the formulation and application of local rules of practice by the District Forestry Boards.

As a guide to thinking and action in the States, it is appropriate to outline in some detail what the Forest Service thinks the federal standards should require. In the first place rules of forest practice should include provision for protecting forest lands against fire. The responsibility of owners and operators in connection with logging, and in disposal of inflammable material resulting from logging operators should be defined. The rules should also provide for protection from insects and disease, including such measures as the disposal of slash, unpeeled logs, or diseased and insect-infested trees when necessary and reasonable. Finally the rules should safeguard the proper use of forest lands and prevent improper exploitation by

(a) Providing for adequate restocking after cutting with trees of desirable species and form;

(b) Prohibiting premature or wasteful cutting in young stands;

(c) Providing for reserving a sufficient growing stock of desirable trees to keep the lands reasonably productive;

(d) Preventing avoidable damage to uncut trees or young growth;

(e) Regulating grazing to prevent damage to tree growth and protect the watershed; and

(f) Prohibiting clear cutting, or limiting the size of a tract that may be clear cut, except where clear cutting is silviculturally desirable or the land is to be put to some other suitable use.

The intent of these standards is clearly to maintain a growing stock of trees of desirable species and of a size larger than seedlings and small saplings wherever practicable. The level of required silvicultural practices

would usually fall somewhat below that attained on the national forests and the more intensively managed private lands. The standards would not of themselves assure sustained-yield management.

In preparing rules of forest practice, forest lands within each administrative area should be classified with reference to such factors as forest type and conditions, topography, prevalence of insects or diseases or other relevant factors. The rules should apply uniformly to all lands within each such class. The several provisions that I have mentioned would be applied to each class so far as they are applicable and necessary, but the rules need not be restricted to these specific provisions. Insofar as practical, rules of practice should be couched in descriptive terms readily understood by landowners. To provide flexibility in the application of good practices to a particular property opportunity should be given for any owner to operate under a working plan for his own property that would not fall below the level of the prescribed rules for the classes and conditions involved.

It is my firm belief that state and Federal Governments must collaborate in a plan of public regulation such as I have outlined. Not only should the States that undertake to administer such forest regulation themselves expect financial aid from the Federal Government, but the Federal Government should expect cooperation rather than opposition from the States in cases where it becomes necessary for it to take over the job or where the State prefers to have it do so.

I am not seriously concerned about the problem of enforcement. Of course, it will take money—and your state forestry department is seriously handicapped by lack of an appropriation with which to work right now. But administration of the regulation I envisage in an atmosphere of helpful official guidance and assistance should have far-reaching educational effects. It is probable and indeed desirable that most owners will soon be led to give their lands more intensive management than will be required by the law. Such an outcome will simplify the task of enforcement, but will by no means eliminate the need for having standards of forest practice established by law.

Forestry Means Human Welfare

In closing I want to congratulate the people of Maryland on the constructive manner in which its new plan to improve private forest practices is being worked out. And I want to assure you that we in the Forest Service want to do all we can to help your program on a truly satisfactory basis.

For success in this program means more than the conservation of a basic resource. It means jobs for workers, opportunities for enterprise, and lifeblood for rural communities which contribute so much to our American way of life.

Wildlife Conservation Problems

CARL D. SHOEMAKER
Secretary, United States Senate Special Committee on Conservation of Wildlife Resources

It is not necessary for me to discuss with this group of enlightened conservationists some of the basic considerations which have led to the adoption of a program which has brought back wildlife populations, if not everywhere abundant, yet, nevertheless, large enough to take care of present needs of the sportsman.

I am one of those conservationists who believes that we are restoring and conserving wildlife for man to utilize. The chase, the hunt, the bag of game are the rewards that come from this program. If we were restoring wildlife for its esthethic value alone, the job would long ago have been completed.

During the past 20 years all major species of our wildlife have increased in numbers. The most spectacular additions have been to waterfowl, pheasants, deer and antelope. These increases did not come about by chance, nor are they the result of haphazard guess work.

There was a time when little thought was given to the conservation of wildlife. Game animals, birds and fish could be bagged by the hardy sportsman almost at his will. All he needed was a gun—and they were not as refined then as now—a fishing pole—most frequently of his own cutting—perhaps a dog, a little ammunition and a line, a few hooks and some bait. More than likely he did not have to have a license, and he was not beset with rules and regulations telling him when, where and how he could reduce game to his possession.

With no authority to look after and keep track of wildlife, it just naturally had to take care of itself. More and more people became interested in its pursuit. Easier access to field, stream and forest came with better roads and wilderness trails. It became popular to hunt and fish. The benefits to man's physical and mental well-being were great enough to give him the desire for more and more contact with the out-of-doors. These increasing journeys into the forests and fields and to the rivers, lakes and ponds brought discussion among those who took them. There were a few prophets who looked with grave concern upon this accelerated activity of the constantly greater number of sportsmen, and the toll they were taking almost unbridled from wildlife populations. They cried aloud in the wilderness. At first little heed was paid to their utterances. Slowly, however, others—more and more of them—gave thought and

voice to some limitation, some restraint upon unlicensed exploitation of our game. State Fish and Game departments were organized—the last one just a few years ago in Mississippi—and the period of conserving wildlife by regulation began. The time, the manner, the number and the place where game might be pursued and reduced to possession were carefully set forth by statute. It was a long time before conservation thought crystalized enough for state legislators to grant to Fish and Game authorities the power of regulation. This power is fundamental if we are to have the wisest management of our wildlife resources. Not all of the states have delegated this power. Not to do so is to put the Fish and Game Board in a straight jacket, padlocked with legislative enactments and hamstrung with provisos and wherefores. No set of officials can administer the game resources any longer under such a handicap. Some latitude—some discretion must be given them. The greater the latitude the better the job of administration will be.

This era of conservation by regulation of seasons, bag limits and other restrictions on the take of game, in spite of some shortcomings, has been generally helpful and beneficial, if for no other reason than at times to point the way to another approach to the problems involved. This phase of wildlife conservation might be called, for lack of a better term, the era of protection and propagation. Under it wildlife has increased in practically all parts of the country. Over a period of 21 years, ending in 1942, there was an average increase of 364% of big game animals in the National Forests.

As these increases in game became evident, the annual surplus of many species became greater and greater and it was then that the second phase of conservation came into the picture. Again, for the lack of a better name, this era might be designated as the wise management and planned utilization of our wildlife resources. How to reap the annual surplus harvest became the headache of our wildlife administrators. The surplus is the difference between the total number of any given species and the number that is required to maintain an annual supply. This does not necessarily always mean the annual increase. If the sportsmen do not take off the surplus then an aggravated problem of administration becomes acute. Deer, elk, pheasants and ducks are examples of this situation.

Game, as well as man, must have food on which to live. If the natural brouse, grass, seeds and other types of sustenance are insufficient on their own range, or back yard, wildlife will seek it elsewhere. We have heard much discussion—heated and acrimonious at times—over whether more domestic livestock or more wildlife should use the public range in the

western states. For the time being at least the solution to this problem has been left to the state authorities in cooperation with the Federal Grazing officials. That it will break out again in the future is just as certain as raids over Berlin. Elk surpluses have increased beyond the annual kill of sportsmen. This gives rise to dispute over jurisdiction between State and Federal agencies.

Waterfowl to the extent of 150,000,000 were estimated to have been on the flyways in 1900. By 1932 this number was reduced to about 25,000,000. Drastic regulations were invoked, a splendid refuge system was started, the birds began to come back. Last December Director Gabrielson stated before the House Committee on Wildlife that "we certainly had somewhere in the neighborhood of 150,000,000 ducks return on the southward migration." This almost unbelievable increase in ten years has brought with it new problems of administration.

Sportsmen, seeing the official figures, are demanding that some further relaxation of the drastic regulations of 1932-1935 be made. Right now there is a drive on to permit the use of a limited number of live decoys in front of duck shooting blinds. A bill has been introduced in the lower House to this effect. But this Bill takes the regulation out of the hands of the Fish and Wildlife Service, and establishes the use of live decoys by Congressional enactment. This, obviously, is wrong. If Congress should pass this bill, it would not be long before some other group of duck hunters would demand a greatly lengthened season, more liberal bag limits, feeding waters during the ducking season, and finally a return to spring shooting. The danger to waterfowl is not in a limited use of live decoys, but in Congress legislating specifically on the subject.

I have no doubt that when the Fish and Wildlife Service is satisfied that the waterfowl population has reached a figure where it is safe to make such a regulation it will be made. Dr. Gabrielson so indicated in his testimony before the House Committee a few months ago. According to his statement he doubts that this figure has been reached.

With another favorable season or two and with no disease or casualty to the ducks on their breeding grounds which would cut deep into their population, there should be ample numbers to maintain a normal supply and permit reasonable relaxation of those regulations which are not harmful in their use—but only so in their abuse—and which give added zest to the chase.

Wildlife is fortunate in having so many earnest official and non-official agencies, groups and individuals interested in its management. Forty-eight State Commissions, the United States Fish and Wildlife Service, the

Forest Service, the Soil Conservation Service, the Grazing Service, the National Park Service, and the Indian Service are seeing more and more eye-to-eye on the problems involved in the management and use of our out-of-doors and the wild creatures that live in it.

To conserve wildlife we realize now, as never before, that we must conserve our soil, our forests and other vegetation. And we must keep our waters as pure and clean as it is possible to do with the many-sided civilization in which we live. We shall never reach the millenium, but it is eminently worthwhile to strive to attain it; for in that effort we find comfort and make progress.

If we understand our task and carry on with the conservation of our soil, timber, water and other resources, America will live, while other nations, less provident, less understanding, will perish from the earth as did so many in the centuries of the past.

Introductory Remarks, Afternoon Session

GLENN L. MARTIN

Chairman

It is appropriate, as well as complimentary of the "American way," that we should in these days of stress be pioneering for better times ahead. America has always been a Nation blessed with imaginative genius, that primary requisite of the pioneering spirit. The important discoveries which immediately can be traced to this elusive part of our makeup are legion and their worldly affect, unnumbered.

Today, we are on the verge of pioneering another discovery; the affects of this one will dwarf all predecessors. We are prime, as a State and as a Nation, to discover—and I am delighted to add, before it is too late—the master plan for the future handling of the "bank" of renewable natural resources with which America originally was so richly endowed.

By the close of this session we will have heard a score or more of the Nation's most eminent authorities speak in behalf of the Country's resources. What will be said about the Nation in general applies to Maryland in particular the same as it does to each of the other 47 states. Baltimore is only one of many places in which such meetings are being held and where such progressive thoughts are being implanted. Here today we are having the opportunity to learn the formula with which America will always be kept the richest nation on the globe, and Maryland, the envy of all other states.

To you, Mr. Williams, noted authority on national economy, and to you Mr. Bromfield, renowned author, and to Mr. Warfield, Dr. Truitt, Mr. Jackson, Dr. Bennett and all other contributors to The Maryland Conservation Forum, I say yours is a most important part in the postwar planning program of America. Yours is the challenge of making America conservation conscious. Yours is the task of instilling in Marylanders the necessity for sound management and sane utilization of her many natural resources.

We must manage our national resources well that their utility will grow increasingly great, that we will always be a strong Nation with ample opportunity for free enterprise to pioneer in the future of a better world.

It is an enviable pleasure to call on the man in whose immediate charge falls all the natural resources possessed by Maryland to open the afternoon session of this Forum. Governor O'Conor, the Forum is yours; several hundred people eagerly await your message on Maryland's conservation platform.

Greetings

HONORABLE HERBERT R. O'CONOR
Governor of Maryland

Permit me to say at the outset that the people of Maryland, who are, of course, the real owners of all the natural wealth with which our State has been so abundantly endowed, owe a real debt to the public-spirited citizens who are responsible for today's Conservation Forum.

Few States, indeed, in all this Nation of unparalleled natural wealth, have enjoyed proportionately greater blessings in this respect than has Maryland. Unfortunately, like the very freedom our fighting men are now risking their lives to defend, these natural resources have been accepted over the years without due appreciation of the responsibilities their enjoyment entailed. In other words, our people, while thoroughly ready at all times to make use of all the wealth of the streams and farms and forests, have not always given thought to the propagation or replacement of that which was used. The result is that now we find many of these once-plentiful resources depleted to the point where only the most intelligent measures will restore and preserve them.

It is beneficial, indeed, to have the many organizations cooperating here today interested in and concerned with these matters, and so many individuals willing to give their valuable time to a consideration of ways and means to improve our handling of these priceless natural advantages.

While admitting fully that there remains much to be desired in the proper handling of our natural resources, we can, I believe, claim to have made real progress in this respect. I shall not attempt to go into any detail, but shall content myself with a brief review of the overall developments as they have affected the handling of the State's resources during this present Administration.

When this Administration took over management of the State's affairs in January, 1939, the natural resources of the State were administered by nine agencies, no two of which agencies were officially connected in any way, except in the case of the Conservation Department and the Chesapeake Biological Laboratory. By legislation sponsored by the State Administration, the agencies which had other affiliations were detached, and by amalgamations were reestablished as the following departments:

Department of Tidewater Fisheries
Department of Game and Inland Fish
Department of State Forests and Parks

Department of Geology, Mines, and Water Resources
Department of Research and Education

These, then, are the present conservation bodies of the State, though if the term be interpreted broadly, the list should include also the Soil Conservation Commission and the Maryland State Planning Commission, which have been active for years. However, we are concerned here chiefly with these five Departments, four of which are primarily administrative. The fifth, the Department of Research and Education, was created for the purpose of gathering factual information on those resources which the other Departments administer. Such information passed on to these other Departments and to the general public is the only basis of a rational conservation program. The great progress made by agriculture has been based on applying the facts learned from scientific investigation, and the field of conservation, I believe, must build on a similar foundation of reliable facts.

The legislation which created these five autonomous Departments required, also, that they be represented on an overall conservation group—the Board of Natural Resources. Membership on the Board carries no stipend, and it is designed as a body completely free of personal, local, or political considerations, which impartially can weigh and consider any plan or device for protecting, rehabilitating, or developing the natural resources of the State.

It can logically be asked: Why have the Board of Natural Resources? Given five autonomous Departments to administer the resources of the State, why create the Board in addition? I need not review all the arguments advanced for such a Board, but the following were the most cogent:

1) Any association of these Departments, however loose, will tend to prevent the dissipation of conservation effort.

2) Association of the Departments in the Board permits of a ready exchange of ideas among Departments and the formulation of complementary policies.

3) By close cooperation in the Board, the Departments can avoid duplication of supervisory and administrative activities.

4) While Departments should be and are the most efficient administrative devices, nevertheless, conservation problems themselves are rarely departmentalized. There ought, then, to be some conservation agency in which these artificial departmental lines are wiped out, some organization in which the Departments merge.

5) Again, where the resources are administered by Departments, there is always some matter or some resource which is the province of no Depart-

ment, some corner of a conservation field cultivated by no Department. An overall conservation body is best situated to observe these problems and to see that they are properly assigned and acted on.

6) Many negotiations with other states, with federal agencies, and with semi-public organizations in the State are best carried on by an agency which represents officially the whole conservation system of Maryland. A single Board can serve better in this capacity than five autonomous Departments.

As a summary of Maryland Conservation Administration, I would offer this: First, that we have provided a research agency to supply us with valid data on the resources of the State; the second, that we have provided the machinery for cooperation among the Conservation Departments, with federal agencies and with neighboring states.

It was, and still is my personal view that much more can be accomplished by the cooperation of separate vigorous Departments than by compressing and confining these Departments into the mold of one authority.

The very great, if unavoidable, waste of and drain upon our national resources in general, occasioned by our war effort, should serve to emphasize the urgency of planning for the protection and building up of such of our resources as are renewable under wise management. I have in mind particularly the soils of our farms, the permanent productivity of our forests, and our potential immensely productive fisheries. We are fighting for the preservation of our freedom and of our Democratic institutions. Even with an Allied Victory, which seems assured, our Democratic institutions will be in competition with other political systems. It would seem important, therefore, that we improve and strengthen our Democratic processes in the interests of their greater effectiveness. Perhaps in no other respect have we in the past failed so greatly as in the wise management and utilization of nature's bounty represented in our natural resources.

The recreational value of our forests, fields, streams, and the open waters of our Bay will no doubt assume added importance to many of our returning soldiers accustomed as they have become to a vigorous outdoor life. This alone is an important reason for developing and safeguarding the recreational values inherent in these resources.

Unemployment is certain to be a serious problem in the readjustment period. The wise development of our renewable resources should do much to broaden our employment base in the years to come and contribute to the general prosperity of the State. In the immediate period of readjustment following the termination of hostilities, projects looking to the improvement of our forests, public recreational areas, and other public

resources most assuredly will occupy an important place in our post-war program.

Even to persons as well-versed as you are in the varied conservation interests of our State, it is satisfying, I believe, to review the activity and purpose of the various agencies charged with the management of our natural resources in the present and the planning for the future. The more general this interest in the State's precious natural holdings extends, the more certain will there be continued betterment in the policies and programs under which conservation affairs are administered.

While there will always be, of course, difference of opinion as to specific details of handling the great variety of matters involved, it is gratifying, nevertheless, to know that the State today is headed in the right direction, under more unified control and under general overall policies such as have been all too generally lacking in former years. Such well-planned forums as this one of today will be of the utmost assistance in focusing public interest on these important matters and in shaping public policies along lines that give greatest assurance of continuing public benefits.

I heartily congratulate all who have had a hand in the organization of this Forum, and pledge to you all, and to the people of Maryland, the continuing and increasing efforts of the State Administration and of the particular agencies involved towards the improved handling of the resources which a bountiful nature has placed in our keeping.

Conservation, A Long View

ALFRED H. WILLIAMS

President, Federal Reserve Bank of Philadelphia

It is a pleasure to come down from Pennsylvania to Maryland on an occasion of this sort. The two states have much in common, their boundaries being contiguous for many miles. In fact, I have heard that over in Harford County the farmers twit the farmers of Pennsylvania about their mode of life, which throws light on the amenities as they are observed down in this state. It is said that the farmers of Maryland sell what they can't eat, whereas the farmers of Pennsylvania eat what they can't sell.

But we are accustomed to good-natured twittings of that sort. In fact, we talk about ourselves in much the same way. The story is going the rounds in Philadelphia about a Philadelphian who visited Paris and went into a restaurant and saw snails listed on the appetizer list; he ordered a plate and liked them very much, ordered a second plate, and then doubled the order, and the waiter stepped out of caste and said, "Where do you come from?" He said, "I come from Philadelphia." The waiter then asked, "Don't you have snails there?" The Philadelphian replied, "Yes, but we can't catch them."

It is a pleasure to come and talk about conservation in a time of war, because the two activities are in direct contrast. War destroys; conservation preserves and restores. The total cost of war to date, this second World War, is $900,000,000,000, with casualties of 25,000,000 persons. Those of you who have read about the total destruction of Odessa by the Germans, when they evacuated it, know that the business of war is to destroy. Indeed, one measure of progress of an efficient army is the extent to which it destroys the lives and the materiel of the enemy; in that process, of course, it destroys its own. Within the hour, we shall have destroyed $10,000,000 of property. We are consuming a quarter of a billion dollars' worth of property and service each day, and all that we expect to get out of this is the retention of our liberty. In contrast, the theme of this conference is to conserve, to maintain, and to protect; it is a pleasant task to step aside from the business of war and contemplate the theme.

Let us take a global view of this business of conservation in this time of global war; we need all the perspective we can get. Indeed, this business of man's inhumanity to man raises the question as to whether we are not at the end of a pretty fundamental era in human history.

Let us take a look at the continent of North America, the continent that the white man met when he stepped onto these shores. The physical

configuration of a continent, as in the case of an animal, is determined largely by the skeleton. In this instance we had three large pieces of bony structure: in the West there were the Western Cordilleras, two high mountain ranges; within those ranges, a high, dry plateau extending all the way from Alaska down the North American continent through to South America. Over in the East we had the lower, smoother Appalachian chain, and up at Nova Scotia, swinging around in an arc, to the Hudson Bay, we had the Laurentian Mountains.

Those three bony structures determined the physical configuration of this continent. Within those mountain barriers we had the greatest expanse of fertile land in a temperate zone on this globe. We had broad, level, rolling ground, abundant rainfall, plenty of water, rich minerals, especially coal and iron and copper and petroleum. It was easily approachable from the European side. It was adaptable to the plants and the animals of the old countries, and there were some new crops here: tobacco, so well-known in this area of the United State, corn, squash and beans. Ten million Indians were scattered broadly over the land.

What was the condition with respect to the other continents? Asia was already crowded. Africa was largely tropical or desert. South America was habitable for the white man only at the narrow southern portion, and on a few plateaus. Australia: partly tropical and largely too dry. North America was the only large body of habitable land for the white man.

The stage was set here in this country for a group of fundamental cosmic forces that were about to be let loose. Let me sketch these. We had all of the intellectual and the spiritual and moral values that were released by the Renaissance. Feudalism was about to die and release the fetters that bound many thousands of men to the soil in an unjust manner. The industrial-mechanical revolution was about to break. Watt had invented the steam engine in 1770 and that engine was applied to mining, manufacturing, agriculture, and transportation. Also there followed what is known to historians as the Pax Britannica—almost a century of peace.

What was the result? The standards of living of man, which had been at a plateau for almost twenty centuries, began to rise. The standard of living of the citizen of the Greek city state was as high as that of the citizen of Elizabethan England. Suddenly all of the aforementioned forces came into conjunction and rapid economic progress ensued. What was the effect? World population increased from 600,000,000 to 1,600,000,000 within the century.

This picture can be brought into sharper focus by looking at developments within this country. Sixty million immigrants were siphoned out of Europe and brought to these shores. What was the nature of these

people? Venturesome, energetic, democratic, liberty-loving, heterogeneous, free from historical drag that traditions put upon people. There was no pushing of the ancestral wheelbarrow ahead of these people. We had freedom of enterprise. We had a plentiful supply of British capital which was amassed due to the fact that Great Britain got a fifty-year head start and was able not only to equip her own plant, but also to provide capital for ours. The result was, with the opening up of this continent and the release of these forces, America participated in building the economic plant of the world. We helped to equip in considerable measure the factories, the farms, the mills, the mines, the railroads: 100,000 miles of railroad were constructed between 1825 and 1890.

From these factors there resulted a high standard of living, the highest in the world, a standard of living the excellence of which we seemed to think derived from some peculiar quality which we alone among the peoples of this planet possessed. We set out literally to subdue the continent, as though the continent were a wild animal whose interests were inimical to the interests of Man. We did conquer the continent. We shipped abroad for decade after decade huge quantities of corn, cotton, wheat, iron, steel, petroleum, copper, pork, lard and many other types of resources. One European historian has wisely said that the flow of these materials to the continent of Europe had an effect upon European civilization comparable to the flow of gold and silver during the days of the Conquistadores. But a large element in this high standard of living which we were able to achieve came from consuming our fat, came from following the policy, "After us, the Deluge." It was by a depletion of our resources that we achieved our very high standard of living.

Dr. Bennett is technically qualified to tell us what this rape of a continent has meant in the way of depletion of soil resources: 100,000,000 acres irretrievably lost, 100,000,000 acres grossly depleted so that we shall have to work vigorously to restore their life, 100,000,000 acres that we ought to begin to conserve immediately; 300,000,000 acres that have been mistreated. What about the balance? Roughly, 460,000,000 acres which we must learn how to live with if they are to be the permanent possession of this land and the heritage of our children.

It will be worthwhile to compare the American standard of living with that of other nations. Sweden is an excellent example of a country with a moderately high standard of living. If I analyze the Swedish situation clearly, this is the result of an unusually homogeneous, intelligent people, plus unsurpassed technology, plus excellent social institutions, plus only average physical resources. But Sweden has made the most of her natural

resources by practicing conservation. The soil and the forests have been husbanded systematically in Sweden since 1600. A decade ago, I visited the country to study its industrial development. We went back country to look at an iron and steel enterprise. This company embraced not only iron mines, smelters, rolling mills and forging shops but also an electric power project, a coal distillation plant, an extensive lumbering operation and many farms. These unlike units were integrated into a single efficiently operating company that gave to its management low labor costs per unit of product and to its employees, steady employment, good purchasing power and maximum economic security.

Japan furnishes an illustration of a country with a low standard of living. The Japanese are an homogeneous people and almost without parallel in the world when it comes to physical energy and a willingness to expend it. Likewise, they have an excellent asset in their modern technology so assiduously copied from western nations. The country has such poor physical resources that they have been unable, despite the aforementioned assets and rigorous conservation practices to overcome their poverty and attain even a reasonable place of living, judged by Western standards.

The burden of this comparison of the three countries is that America, if it is to have an enduring high standard of living, must conserve its rich foundation of natural resources. The United States must not assume that its standard of living will continue to be superior to that of other places. Indeed the Beards in their two-volume work, *The Rise of American Civilization*, opened with this sentence: "The discovery, settlement and expansion of America form merely one phase in the long and restless movement of mankind on the surface of the earth." In closing their thesis they philosophize in these words: "Viewed from a high point in time, the drama of the races seems to be little more than a record of migrations and shifting civilizations, with their far-reaching empires—Babylonian, Egyptian, Persian, Abyssinian, Athenian, Roman, Mongol, Turkish, and Manchu—as fleeting periods of apparent pause and concentration in the universal flow of things."

The pages of history are replete with illustrations of the decay of nations that in their day and age had standards relative to those of their neighbors far superior to ours. Indeed, the day is now here when certain sections of our country have low standards of living. Three areas of resource depletion may be cited—the cotton belt, the cut-over lands in the North and the dust bowl.

The cotton belt is a case in point. A friend of mine, an economist of the Cotton Export Association, says that American cotton at the present time is selling from six to eight cents per pound above Brazilian cotton of comparable grade in the foreign markets. Why are we now high-cost producers of cotton? In considerable part it is because for decades we shipped cotton abroad with tons of top soil, figuratively speaking, in every bale of cotton. We denuded from the surface of much southern land the vegetation and top soil and left the raw, red earth and high costs arising from erosion, foods and drought. Poor land makes a poor farmer and in turn a poor farmer makes poor land. It is a vicious downward spiral.

Many people, particularly those trained in engineering, say: "Can't we rely on science and technology to bail us out?" Science can, of course, synthesize many of nature's products but it is not an adequate substitute for what has been aptly called the "balance of nature." You cannot disturb the balance of nature as we did when we set out to conquer the continent without violating the mutual interdependence of soil and water and grass and trees. Nature will retaliate. We cannot with impunity continue to violate her laws. When the land weakens, the whole structure weakens and, ironically, those who cherish free enterprise and *laissez faire* and do not practice conservation of natural resources bring about conditions that lead to government interference and drastic curtailment of free enterprise.

Turn aside from economic values and look at the moral and spiritual values. When we mistreat nature we destroy the æsthetic value that comes from the sense of being a part of a special place. Once upon a time I traveled to Europe with a custom tailor from Fifth Avenue, New York, a man who had achieved a competence in his trade. He talked for days about his home in Norway. Finally, we reached his home on the Norwegian coast. Ignorantly, with no sense of being a part of that special place, I thought: "What a God-forsaken place!" But it was home to him, a vital part of that man's relationship to this planet. To him it was beautiful! The State of Maryland is beautiful and to defile such a place or to destroy its beauty is to destroy spiritual and aesthetic values.

This whole conservation movement and it is becoming national—note the inquiries from Virginia and New York mentioned by your Chairman—is part of a deep inner questioning. We are examining closely the fabric of the thing we call Civilization. No doubt, this is because we have witnessed from day to day the ultimate in the degradation of the human spirit. There is a deep fundamental urge to make peace with nature and the Friends of the Land Movement may well be a symbol of a spiritual rebirth. You Marylanders who are concerned about the preserva-

tion for your children and their children of this beautiful countryside which for the American Indian was literally an Elysian Field are to be congratulated. Your friends hope that this land will be restored to much of its primitive value. The people of Maryland have a myriad of friends who wish them well in this endeavor. God speed you in it!

Conservation Problems and Progress in Chesapeake Bay

EDWIN WARFIELD, JR.
Chairman, Commission of Tidewater Fisheries

It is evident that in the ten or twelve minutes available for this discussion, I can present only a very sketchy report on the problems involved in the better ordering of our Chesapeake Bay fishery economy. However, it does give me, as a representative of the Department of Tidewater Fisheries, pleasure to report to you on the work in our field of conservation endeavor. With the support of an informed public, there is reasonable assurance that well conceived programs for conservation administration can be effectuated, to be sure.

Most of us are, I believe, impressed with the importance of practicing soil erosion control measures. However, no matter how complete or effective these measures may be, basic mineral elements will continue to be leached from the soils of our farms and carried in solution by our streams and rivers to the Chesapeake Bay. We, here in Maryland, have a further line of defense, however, against this wastage, for these mineral elements, augmented by those contained in drainage from a vast area of fertile farm lands in Pennsylvania and New York, produce in the slow moving waters of the Bay and its tributaries a rich growth of tiny aquatic flora which supports the varied marine life of such interest and value to our State.

Our shortsighted failure through many decades to utilize more than a small fraction of the productive capacity of this million and one half acres of rich aquatic pastureland seems almost incredible in its wastefulness. Estimates vary greatly, but the annual direct loss measured in terms of the value of what we might harvest from the Bay as compared with what we now take is approximately $9,000,000, figured at 1940 price levels. This is on the basis of the value of the catch to the watermen. The employment afforded in catching, processing and selling this greatly enlarged output, if we can achieve maximum productivity, would be of major economic importance to our State.

Our concern, however, should be not only with the economic values of our commercial fisheries, but with the recreational aspects of a well stocked Chesapeake Bay to the sports angler, both those among our own citizens who in more normal times look to our Bay for wholesome diversion as well as the visitors who are attracted to its broad waters.

The failure of our State to manage more effectively the Bay resources must, in the final analysis, be attributed to a lack of appreciation by the general public of the value of the Bay to the people as a whole. Among the more important factors which appear to have militated against the effective handling of the problem in the past have been the lack of a long range program, and of a permanent and stable administrative agency to carry it out had one been evolved; lack of adequate basic information as a guide to sound administration; political interference with administration and law enforcement; and in general the short range selfish interests of the few who have too often prevailed over the long range advantage of the many.

In the last few years determined efforts have been made to overcome these obstacles to sound and effective conservation, and we believe that some progress has been achieved.

Improved administrative machinery has been set up designed to insure greater continuity of policy and freedom from political interference. The patrol and inspection force has been reorganized and will shortly be in uniform. However, the adoption of higher educational and physical standards and the establishment of a training course for new appointees, all necessary if highest efficiency is to be obtained, will have to wait the return of more normal manpower conditions.

As will be explained by Dr. Truitt, greatly expanded research programs have been cooperatively undertaken by the State and Federal research agencies and should produce information of the greatest value as a guide to policy formulation and sound administration. Furthermore, more complete, accurate and timely statistical information regarding catches is being provided to strengthen fishery management programs. Through the machinery of the Board of Natural Resources close liason and cooperation is being maintained with the other State Conservation Agencies. Through the medium of the Atlantic States Marine Fisheries Commission frequent meetings are being held between our administrative staff and State and federal technical advisers, and those of Virginia, looking to the more effective management of those resources of the Chesapeake in which the two states have a common interest.

From the standpoint of its potential value to the State as compared with the relatively low level of production that has prevailed for a number of years, the oyster problem constitutes one of the most challenging, if not the most challenging conservation problem confronting the citizens of our State. If we are able to find the means of increasing our present production five-fold, we should then have only equalled the production which, accord-

ing to Mr. Edwin Baetjer's careful studies, was maintained in this State through the twenty year period from 1870 to 1890, when our average annual yield was better than 12,000,000 bushels. Competent students have felt that even that large production might be exceeded under intensive methods of cultivation. Both the Board of Natural Resources and the Commission of Tidewater Fisheries are giving much study to the question of the methods and procedures by which this greatly increased production may best be achieved. In the meantime the Commission of Tidewater Fisheries is carrying on a program which it believes will result in a very material increase over the production which has prevailed for a number of years.

This oyster program, in brief, involves an effort to improve the efficiency of the farming operations carried on by the State by the application of procedures which have been found effective in the hands of private oyster farmers. At the same time, efforts are being made to render more profitable and stable the operations of private planters on bottoms leased from the State.

Perhaps the weakest point in the oyster management programs of the past, whether in State or private planting, has been the lack of a dependable and adequate source of seed oysters. Though a number of areas in the State were recognized as potentially productive seed areas, restrictive laws have prevented the proper development and use of these areas. Legislation was enacted, however, at the last session of the General Assembly which permits the development and use of these areas, a number of which are now being tested and give promise of substantial productivity. The Department of Tidewater Fisheries is, in fact, now actively engaged in transplanting from such areas to growing bars considerable quantities of seed oysters produced under the new program of oyster management. This seed, as well as that resulting from natural growth, also is being made available to private planters.

Every effort is being made to conduct these operations on a self-liquidating basis with the objective of having the State's investment in the oyster farming program constitute a capital investment to be recovered out of the harvested crop rather than to be treated as an annual subsidy to the industry. If this procedure is consistently followed, it should, in the judgment of our Commission, result in a steadily rising level of oyster production. These oyster cultural operations are being based on the experience of practical men in the industry as well as on studies being carried on by the State and federal research agencies, and are being and will continue to be the subject of careful testing and checking by these same agencies.

I am pleased to report that there was a rather widespread and heavy set of spat last season on both the natural growth and on shells planted under the current program. The extent of this set would seem to indicate a rather marked upturn in total oyster production when these seed come to legal maturity within the next two or three years.

Stimulated by the remarkable recovery of the shad fishery of the Hudson River in recent years, as well as by the low current yield of a number of our own important species in the Chesapeake, representatives of the fishing industry, working with the Commission of Tidewater Fisheries and under the advisoryship of the Department of Research and Education, developed and secured the enactment of a measure designed to make possible the rehabilitation of our Maryland shad fishery as well as our once very important herring fishery, and also to bring recovery and stability to our other important Chesapeake fish populations. The effect of this law is to place a ceiling on the total number of licenses issued to commercial fishermen as well as to the number of nets fished. The Commission is empowered to issue additional licenses only when the recovery of the fishery would appear to warrant such action.

A continuing and comprehensive study is being conducted by the research agencies to ascertain the effect of this measure on the abundance of our principal species. Though perhaps too soon for final conclusions, these studies clearly indicate that this measure is having a beneficial effect upon the fisheries and if continued in force and effectively administered, should in time result in their restoration to a high level of productivity. The approach to the always difficult problem of fishery conservation which this measure makes has aroused considerable interest among fishery administrators and interests in other states. The law is being intensively studied to determine whether or not its principles may not be applied with advantage to the fishery management problems in other jurisdictions.

Although the law safeguards the right of a citizen to fish with hook and line and to use small nets for non-commercial operations, it does very definitely place limitations upon those desiring to enter the commercial fishing industry as well as upon licensed fishermen desiring to expand their operations. The law has therefore been under attack and will, no doubt, continue to be under attack by special interests. However, in view of the difficulty of devising and putting into effect a more workable substitute and of the advantage to the State as a whole of bringing about as rapidly as practicable the full potential productivity of our Chesapeake Bay fisheries, it appears to us that the maintenance of the present measure, as well as its proper administration, is of outstanding importance.

The Chesapeake Bay blue crab holds, I believe, a unique place in the esteem of consumers of Maryland seafood. Unfortunately, it too must be listed among those resources which are seriously depleted, the average catch in Maryland in the past decade having been about sixty percent of what it is believed could have been secured under proper management. More recently the production has been even lower. Although the short life cycle of the crab and the remarkable recuperative powers of the crab population encourage us to believe that given proper protection, the recovery of this fishery to maximum production could be very rapid, the problems of achieving this recovery is greatly complicated by the fact that we share the resource with Virginia and hence any plan of restoration to be effective must be supported in both States. Having in mind these considerations, the Tidewater Fisheries Commission has directed particular and continuing efforts looking to the development of cooperative effort on the part of Virginia and Maryland.

Working through the machinery of the Atlantic States Marine Fisheries Commission, a special panel on the Chesapeake Bay fisheries has been established for the study and consideration by representatives of the two States of the problems in which the States have a common interest. Regular meetings of this panel are being held in an effort to develop an effective program at the earliest possible date. In order to secure information upon which to base such a program and in order that the facts established by such research may be received in each State as being free from bias or self-interest, the U. S. Fish & Wildlife Service was requested to and has detailed a special investigator to carry on these crab investigations. Technical staffs in Maryland and Virginia are cooperating in this work which has been in progress for three years and now appears to have reached the point where some rather definite conclusions may be drawn.

In order to enable the Maryland Commission to work with Virginia in formulating a management program, broad regulatory powers were delegated to the Maryland Commission by the last regular session of our General Assembly, the exercise of such discretionary powers being subject to review by the Maryland Board of Natural Resources.

A meeting of the Chesapeake Bay panel is to be held in Baltimore tomorrow when the principal item under discussion will be further consideration of the crab problem. We do not wish to suggest in advance of this meeting what further measures, if any, should be adopted, especially as we do not now have the benefit of information which will be made available to the conferees at that time by the federal and state research staffs. We can say, however, that it appears to us on the basis of informa-

tion which we do have, that further protective steps are going to be necessary if we are to insure the maintenance of an adequate spawning population. All we can say, at this time, is that we are hopeful that out of our joint deliberations may come the adoption of measures which will be effective in bringing about a rapid recovery in this important resource.

Governor O'Conor has touched on some aspects of the relationship of the war to conservation. There is one thought I wish to express in that connection. The importance of maximum food production is being strongly advanced from time to time as an argument for the temporary relaxation of certain of our fishery regulations. Such a course of action might be entirely justifiable under conditions where the resource was not already seriously depleted, but at this time to bear more heavily on limited brood reserves which are vitally needed to restock our Bay would appear to be the height of short-sighted folly. Such a temporary "shot in the arm" policy would soon result in further marked depletion occuring probably within the period when our national food needs will still be critical.

May I say again, in conclusion, that the best assurance of the continuing recovery of our Chesapeake Bay fisheries is an active and informed public opinion. Your presence here today is proof of the strong interest in conservation in Maryland. It affords a sound basis for the belief that progress in the years immediately ahead of us will be substantial and permanent. I do not believe the people of Maryland henceforth will stand by and permit the State to continue or to repeat the past waste and carelessness which have so often characterized the handling of these vital resources.

Chesapeake Fisheries, History and Outlook

CHARLES E. JACKSON
Assistant Director, U. S. Fish and Wildlife Service

I am grateful for this opportunity to talk to you about the tidewater fisheries of the Chesapeake Bay. It comes at a particularly opportune moment. Throughout the country as a whole, there are definite signs that we Americans are awakening to a fuller appreciation of the importance of our aquatic resources. After centuries of taking the wealth of our waters for granted—centuries during which one after another of our most valuable fisheries has undergone serious depletion—we are at last getting ready to do something about it. Early in the post-war period, I have every expectation that active programs will be undertaken in all sections to restore and develop the fisheries. The Chesapeake Bay must have its part in that program, and so I want to tell you today something of its broad outlines and more particularly of the great opportunities which the Bay's fisheries present.

There is now before the Congress of the United States a resolution directing the Fish and Wildlife Service of the Department of the Interior to conduct a survey of the character, extent, and condition of the marine and fresh water fishery resources—both commercial and recreational—of the United States and its territories, and to submit to Congress before next January first a detailed report of its findings, together with recommendations for a comprehensive program to develop and restore our aquatic wealth. This resolution, which was introduced in the Senate on January 26 by Senator Josiah Bailey of North Carolina and in the House of Representatives on February 29 by the Honorable S. O. Bland of Virginia, has been passed by the Senate and is now before the House Committee on Merchant Marine and Fisheries. If it is adopted,[1] this will be the first time since 1871 that Congress has of its own initiative called for a report of this nature. I think we may fairly take it as indicating a desire on the part of the people of this country, as reflected by their elected representatives, to realize the full possibilities of our fisheries, which long have occupied somewhat the position of a stepchild among our natural resources.

Despite the fact that, throughout the long history of our fisheries, we have had no coordinated program in which the efforts of all the states and the federal government have been united, the United States occupies

[1] The resolution was subsequently adopted and was signed by the President on May 11, 1944, becoming Public Law No. 302.

second place in the production of fish and shellfish among all the nations of the world. Our average production of about four billion pounds is exceeded only by Japan. Yet this production could be increased substantially by opening up certain areas as yet undeveloped, by utilizing species that are now neglected, and by eliminating wasteful and inefficient practices in the taking, processing, and distributing of the fishery yield.

As citizens of the Chesapeake Bay area, you are naturally most interested in the possibilities of restoring and developing the fisheries of the Bay. The Chesapeake is justly famous as a fishing area. In many respects it occupies a unique position among the nation's fisheries. It produces more oysters than any other section of the Atlantic, Pacific, or Gulf coasts. This distinction it has held since the early days of the oyster industry, despite the fact that the oyster crop of the Bay, due to long-standing neglect of proper conservation measures, is now only a third as large as it was fifty years ago. The Chesapeake is the center of the nation's crab fisheries. It also boasts the largest yield of such staple food fishes as the sea trout, croaker, and river herring, and it is the center of the fishery for the striped bass.

The total yield of the Chesapeake Bay is now between 300 million and 325 million pounds—about 8 percent of the total production from all sections of the United States and Alaska. With due regard to the size of the water areas involved, this figure represents a high rate of productivity—quite possibly the highest of any section.

Looking into the historical records, we find that the total yield of the Chesapeake has not changed greatly since the 1880's. At first thought we might draw considerable satisfaction from that fact, inferring that the toll of half a century has left our aquatic resources undepleted. However, let us look into the facts a little more closely.

The half dozen species of greatest importance in the Bay today, from the standpoint of volume of production, are menhaden, oysters, croakers, crabs, river herring, and sea trout. These six account for 90 percent of the total production. Four of these species show striking decline from their peak production. Those depleted species are menhaden, oysters, crabs, and river herring. In 1941, only 182,000,000 pounds of menhaden were taken, compared with 366,000,000 pounds in 1920. Oysters have fallen from 117,000,000 pounds in 1880 to 35,000,000 today. The yield of crabs reached 69,000,000 pounds in 1930 but is less than half that at present. River herring has dropped from 67,000,000 pounds in 1908 to 17,000,000 pounds.

Bear in mind that the fisheries for menhaden, oysters, crabs, and river herring are among the oldest in the Bay. They, along with the shad which

has declined to about a fifth of its former yield, are the species on which the Chesapeake's fishery fame was built. They are a warning that what has happened to them can happen to others. They are a challenge to us to take active measures before depletion has proceeded so far as to make rehabilitation impossible.

What are the opportunities for restoring and developing the seafood resources of the Chesapeake? I think we are in a better position to answer that question today for the Chesapeake than for any other section of the country. Its area is not large compared with the vast fishing banks of the North Atlantic or the long and enormously varied coastline of Alaska. For this reason it has been possible for engineers, hydrographers, and biologists to study it rather extensively.

It is safe to say that we are not likely to open up any important new fishing grounds in the Bay. The fisheries now are scattered along the entire shoreline, and the total area is not so large that any important resources can very well have remained undiscovered. The single important expansion of the Chesapeake's fisheries which has occurred in recent times was unique and will not be duplicated. This was the development a little more than 10 years ago of a winter fishery, prosecuted by ocean going trawlers, off the mouth of the Bay. This fishery draws upon the same stocks of fish that are present within the confines of the Bay during the spring, summer, and early fall. When their wintering grounds were discovered, an offshore fishery was developed which is the source of the sea trout, croakers, sea bass, and flounders that now come into the markets of Baltimore and Washington during the winter, a season when these fish were formerly unobtainable.

The situation in the Chesapeake is entirely different from that in Alaska, where we are confident that not one, but many new fisheries will be developed in the near future. In the waters of Alaska, which cover approximately 50 degrees of longitude and 20 degrees of latitude, there are some 300 species of fish. It is almost incredible, but nevertheless true, that 99 percent of Alaska's large fishery production consists of only 3 species—salmon, herring, and halibut. In contrast, about 200 species of fish visit the Chesapeake at some season of the year, and at least 60 of them are taken commercially. There is little doubt that all of the food species that are numerous enough to support a commercial fishery are now being exploited.

Then how and in what fields may you expect to expand and develop the Chesapeake fisheries? You have a two-fold opportunity. First, you can apply to the fin fisheries a system of scientific management that will

stabilize and in some cases greatly increase their yields. Second, you can place the shellfisheries under an intelligent system of cultivation or water farming that will improve the quality, increase the quantity, and safeguard the production of these, the most valuable of all resources of the Bay.

You are fortunate in having especially favorable conditions for the accomplishment of these ends. In your Tidewater Fisheries Commission you have a body of intelligent, progressive, and competent administrators. Speaking for the Fish and Wildlife Service, I want to take this opportunity to express our sincere appreciation of the fine spirit of cooperation which your Commission has showed, not only in its dealings with us, but in its approach to problems of an interstate character. Another favorable circumstance is the fact that both of the Chesapeake Bay states are members of the recently established Atlantic States Marine Fisheries Commission. This Commission was set up in recognition of the fact that fish do not observe boundary lines but migrate freely from one to another, hence no effective conservation is possible without cooperation between the states. The Commission provided the machinery by which such cooperation may be effected.

It is fortunately true, also, that the Chesapeake is an ideal area for the successful application of the principles of modern fishery management. Its major fisheries are established; their potential productiveness is reasonably well known. The exploratory period in the development of your fisheries is behind you. It now remains to make the best use and to realize the full possibilities of this great natural wealth.

Now let us see by a few examples what you may expect to accomplish by managing your fisheries scientifically instead of exploiting them blindly.

The decline in shad production in Chesapeake Bay has been causing an annual loss of income which even in prewar years amounted to at least $500,000. This fishery once yielded 17,000,000 pounds a year. Production now is only 3,000,000 pounds.

The amazing recovery that has taken place recently in the Hudson River shows us that this is an unnecessary condition which need not be tolerated if simple and commonsense measures are taken to correct it. In 1916, the shad runs of the Hudson had declined so alarmingly that catches were less than one percent of the yield of about 1900. In contrast to that condition, fishermen today are taking more shad in the Hudson than have ever been caught there before. The reason is simple—the fishermen on the Hudson River are required to allow enough shad to spawn. By observing this simple and obviously essential rule, they have not only restored the shad runs but have benefited themselves and added to the economic wealth of the community.

Fish and Wildlife Service biologists have found that in the Hudson, where there has been a complete recovery of seriously depleted runs, fishermen are taking 60 percent of the shad that come in from the ocean to spawn; leaving 40 percent of each run to continue their journey to the spawning grounds and deposit their eggs. In the Chesapeake, however, the toll of the fisheries amounted to 92 percent! It is not hard to understand why, with only 8 out of every hundred shad allowed to spawn, the shad fisheries of the Chesapeake Bay are in their present state of depletion.

A few years ago the first step was taken to restore the shad runs of the Bay, increase the income of fishermen, and give the public a larger supply of the choice Chesapeake shad. This was the adoption, by the Maryland legislature, of a measure sponsored by the fishermen themselves and fully approved by the Maryland conservation officials. Its effect was to control the number of licenses issued for fishing in the Bay and by this means to prevent excessively heavy fishing.

I take it that most of you are familiar with the general purpose and provisions of this licensing plan, which has come to be widely known as the "Maryland Plan." By its adoption Maryland has made itself the most progressive state in the union in matters of fishery conservation, for it is the first state actually to have enacted the principles of modern fishery science into law. Many other states are watching the operation of the Maryland plan with the greatest interest. It is especially important, therefore, that it be safeguarded against the attacks of minority groups and be given public support.

The Maryland Plan does not necessarily call for continued reduction in the number of licenses. It merely provides for control of the number of licenses issued, so that the intensity of the fisheries may be brought into harmony with the condition of the stocks of fish. Because of war conditions reduction of the number of fishermen has taken place faster than had been anticipated. Many shad fishermen have already gone into service or into other occupations. As a result, the fisheries last year took 77 percent of the runs, instead of 92 percent as in 1939. Even this rather slight reduction has brought about highly encouraging results. The number of spawning shad last year, and probably the year before, was twice as great as in 1939. This will mean larger runs two or three years from now and progressively larger runs in future years. It represents the beginning of the tide of recovery which, if aided and not hampered, should run as strong as in the Hudson.

The important thing is the demonstration that in the Chesapeake, as in the Hudson, reduction of the fishing rate has been followed by a prompt

increase in the abundance of shad. We do not know yet what percentage of the runs the fishermen in the Bay can take with best results. It may be that the present 77 percent fishing rate is low low enough to permit full recovery. It is essential, however, to hold the fishing intensity at least at its present level so that we may find out how large a stock can be built up under these conditions. Of one thing we can be sure—the gains that have been made will be quickly wiped out if the present controls on fishing intensity should be removed.

The war, with its demands for more and more protein foods to feed our fighting men, our allies, and ourselves, has already put the Maryland licensing system to a severe test. Persons who misunderstand the purpose of the plan or who, for reasons of their own, oppose it, have urgued that it is foolish to place any restrictions on the amount of fishing when we need so urgently to increase our total yield. These people disregard, or fail to understand, two fundamental things. First, if you fish harder in a badly depleted fishery like the shad fishery, in the long run you take fewer fish, not more. Second, our need for more fish is not merely a need of this year or the next. An acute food problem will be with us not only during the remainder of the war, but for a number of years after hostilities cease. In the fisheries our best provision for meeting that need is to adhere to a sound management policy.

Turning from the fin fish, we come to the fishery that has made the Chesapeake Bay famous throughout the entire country—the oyster fishery. Because the state of Maryland and Virginia and the Fish and Wildlife Service are now joining forces in a cooperative program to restore the sadly depleted oyster fisheries of the Bay, I am especially happy to have this opportunity to tell you what we are going to do and what we expect to accomplish.

The story of the oyster fishery of Maryland and particularly of Baltimore is a sad example of the rise and decline of a valuable sea food industry which once provided a comfortable livelihood for thousands of citizens and spread the fame of the City of Baltimore to the remotest corners of the world by supplying its famous product, the canned "Cove Oyster." Today not a single oyster canning house is found in the city where more than 50 establishments produced canned oysters in 1890. Although several smaller centers of the oyster industry, located in a more favored geographic position, developed while the Baltimore business declined, the disintegration of the oyster industry was state-wide and was directly traceable to our neglect of the basic principles of conservation. Dr. Truitt of the Maryland Board of Natural Resources has estimated that during a half century from the early Eighties to 1937 the production of oysters in

state waters declined from the maximum of about 15,000,000 bushels annually to a minimum of 2,000,000 bushels. The magnitude of this loss is tremendous. In terms of protein food it would be equivalent to the loss of a herd of about 160,000 head of big steers, far more than are now produced on the farms of the State.

This decline has not been caused by natural changes in the quality of the water or of the bottoms of the Bay. The potential productivity of the Chesapeake remains today the same as in the past. In Maryland the inroads of domestic and industrial pollution fortunately have so far been limited to the restricted and relatively small areas near Baltimore and Annapolis and have not affected the upper part of the Bay in the same manner as pollution has spread in Virginia waters, affecting thousands of acres of the best oyster grounds and rendering them unsuitable for the production of oysters for market. Furthermore, Maryland waters are free from many dangerous pests such as starfish and drills, which annually destroy millions of dollars worth of oysters in adjacent areas.

The decline in the productivity of shellfish-bearing bottoms of the Bay has been the result of the method of exploitation. This has completely disregarded the fundamental principles of conservation. The basic idea of conservation is simple and can be formulated in a few words—you cannot take more than nature replaces through reproduction and growth. For more than a hundred years the oyster bars and reefs of the Chesapeake Bay were subject to fishing without any regard for the rate of natural replenishment. No wonder that many productive grounds became so depleted that their former average productivity of about 40 bushels per acre declined to only a few bushels per year. The depletion of some of these grounds is so great that their self rehabilitation is almost impossible.

It has been established beyond question, however, that the productivity of oyster bottoms can be indefinitely maintained and even materially increased by applying cultivation methods. Thus, private oyster farming has been markedly successful in New England and in the State of Washington. Not only have high production levels been maintained but many thousands of acres of nonproductive bottoms have been converted into fertile underwater farms. When the country is in need of protein food the question of who would produce it has little significance. It is immaterial whether oyster bottoms are cultivated by private planters or by the state governments which control and manage the fishery. What is important, however, is that the existing bars or reefs be efficiently utilized to permit maximum harvesting without depleting the resource. This requires introduction of a system of exploitation under a plan of effective management.

Since public opinion is strongly opposed to private planting in Maryland your State government has no alternative but to enact a system of exploitation of the public grounds which will maintain their productivity on a sustained yield basis. It is one of the purposes of our investigation in the Chesapeake Bay to collaborate with the State Commission of Tidewater Fisheries by providing technical and factual data necessary to execute such a plan.

Shellfishery experts agree that lack of seed oysters is at present the greatest handicap in the development of the oyster industry. It is a well known fact that certain areas are more adaptable to the production of seed oysters than to growing oysters for the market. It is our intention to locate these areas and to find out how to produce more seed per unit area than is obtained under natural conditions.

Good oysters, like good vegetables and other crops, require good care. They should be properly thinned to avoid overcrowding or they may be transplanted to special bottoms for rapid growth and fattening. These bottoms should be located and the conditions under which oysters would rapidly grow and fatten should be recorded and analyzed. In the past many failures in the cultivation of oysters have been due to overcrowding, that is, planting more oysters than the bottom is capable of supporting. Whether any given bottom is able to grow 500, 1000 or even 1500 bushels of market oysters per acre is something that must be studied and determined by experiment and observation.

It is expected that some of the questions will be answered in a short time while others will require time-consuming and intensive studies before the solution can be suggested. Thanks to the excellent cooperation offered by the State Commission of Tidewater Fisheries and by the Maryland Department of Research and Education, the work will be carried out on a large and comprehensive scale commensurate with the importance of the project. The Service has already perfected plans for establishing field headquarters at Kent Narrows for the upper part of the Bay and at Cambridge for the work to be conducted along the Eastern Shore, Tangier Sound and adjacent areas. Observations on the time of spawning and setting of oysters and their growth on various grounds will be conducted this summer at about a dozen various places in these two areas. The results will be made available immediately to the Tidewater Commission so the State may have full benefit of the factual data collected and analyzed by Federal experts.

In this project your Fisheries Commission has rendered close and friendly cooperation and we are confident that our joint efforts will result

in the rehabilitation of the oyster resources of the Bay.

When we review the decline of the Chesapeake Bay fisheries since the 1880's, it is incumbent upon us to determine the reasons for this decline. I believe it is due not so much to a lack of biological and scientific information as to the political wars that have raged in the Bay year after year. One might charge this depletion, therefore, to ill-advised politicians, but this would hardly be fair since the politician represents large groups of people who insist upon their taking such a position. These people are usually the fishermen, or watermen as you so aptly call them in Maryland. We must ask ourselves, then, what influences the fishermen. We can only come to the conclusion that many watermen fear that their inalienable rights are likely to be tampered with. I think then that we must conclude that a part of the depletion of the Bay fisheries is due to a lack of understanding on the part of the watermen.

Administrators and scientists, and that includes both federal and state, have had too strong a tendency to work out their problems without adequate consultation with the fishermen. No matter how fine a conservation program is developed, it is not worth the paper it is written on unless the fisherman puts conservation into actual practice. We must, therefore, have erred in our human relations. For instance, I wonder how many actual honest-to-God fishermen are in the audience today? Were they invited? I know of similar conferences where they have been invited and urged to come but failed to respond.

In proceeding with the restoration of the Chesapeake Bay Fisheries, should we not now give immediate consideration to a plan that will take the problem to the fishermen personally in every community on the Bay? It seems to me that we should call meetings exclusively for the fishermen. At those meetings the administrators and the scientists should prove their case to the fishermen. Once the fisherman can be convinced that we are working for his gain and his benefit and that there is no ulterior motive to destroy his water rights, perhaps we can move forward more rapidly.

We have practiced this in the two international commissions of which I have the honor to be a member, and as a result we find the fishermen not only cooperating but supporting our program by aiding in securing the necessary appropriations. At every meeting of our commissions we have representatives chosen by each group of the fishermen present, at which time we demonstrate by maps and charts exactly what is happening in a given fishery, why we think certain programs should be followed, and what financial benefits will accrue to the fishermen and the fishing industry. I recommend that the State of Maryland and our Service inaugurate a

system of this nature. In the final analysis, the success of fishery conservation is almost entirely dependent upon the attitude of the fishermen.

For the Chesapeake Bay fisheries as a whole, a good beginning on a sound program has been made. The gains of recent months must not be lost by slipping back into carelessness and neglect of the abundant natural resources of the Bay. The nationwide awakening of interest in the fisheries and of a strong determination to realize now the full benefits of the wealth of our waters has created an opportunity that may not arise again within our generation. Let us not pass it by.

We are living in a time of rapid and startling change. The new developments of today are superseded by still newer inventions and discoveries tomorrow. One result of this war may be stated with confidence—it is carrying us forward precipitously into an age of science. If the airplane industry, the livestock industry, or the mining industry should attempt to operate in total disregard of the discoveries and methods of science, their folly would be apparent to everyone. Neither can the fisheries afford to neglect the application of scientific knowledge. Their prosecution must be guided and directed by legislation firmly based on scientific research. The hard penalties of haphazard exploitation have been too clearly demonstrated.

As representatives of the leading conservation groups of Maryland, it must be your responsibility to foster and promote a public opinion that is informed on the needs and problems of the fisheries and to see to it that your state continues on the progressive course it has charted.

Research and Education

R. V. TRUITT
Director
Department of Research and Education

It was my thought until I listened to the many fine papers here today that Mark Twain, when he said "Of all animals in the world, only man can blush, or should blush," meant the research worker in conservation. However, after hearing repeated emphasis placed on the need of conservation education and the many failures in conservation practices because of lack of educational activity, I am now convinced that Mr. Clements was pointing his finger at those of us in this field of major interest. Surely conservation education has been sadly neglected in this "land of boundless resources and riches inexhaustible." Otherwise, the tragic stories of decline in Maryland's renewable assets would not have been recited by those from the State who have preceded me on this rostrum.

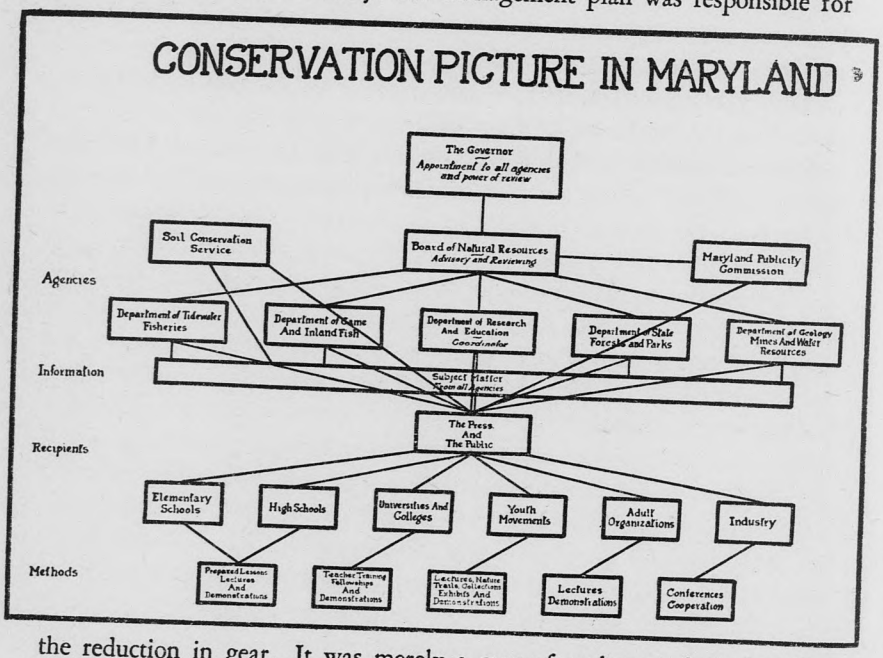
Having heard the facts about depletion of soil, water, timber, fowl, fish and the rest, and having appraised the conservation situation in Maryland in terms of the statements made and in terms of your own observations and experiences, you now ask very naturally, what is being done to build up factual information upon which most effective management programs can be based? You will say that only through an enlightened citizenry, ably lead, can conservation frontiers be extended and the roots of the movement driven deeply to promote and further the socio-economic wellbeing of the public.

Governor O'Conor has pointed out to you how the State recently has provided an agency and implemented it with funds for the furthering of research and education in conservation. By referring to the accompanying chart, the educational aspects of the Department are apparent. In the interest of time economy, it is necessary that we pass over the details of the education program. Suffice it to say that the second ranking man in the Department will head up this work. The activities will include school, club, service organization and other programs, while emphasis will be placed on contacts with owners, operators and workers in the field of natural resources. Printed matter, talks, demonstrations and conferences will constitute the channels through which the information that accrues from our own researches and from the offices of the several conservation agencies, state and federal, will be carried to the public. Cooperation with the Soil Conservation Committee and the institutions of higher learning in the State rounds out in a general way the organization and function of

the Department's education work, the program for which is still in a formative stage.

The Maryland Management Plan for fisheries was outlined to you earlier on today's program. Let's now briefly survey the principles, practicality and benefits to Maryland from such a program. Then we can attempt to show how the factual information behind such practices is gathered, analyzed and organized by the fishery biologists of the Department into a useable form.

The principle of reduced fishing upon which the Maryland Plan is based, has effected an almost miraculous recovery in the Hudson River. The shad catches in that area have increased from 40,173 pounds in 1916 to 4,253,000 pounds in 1942. This was possible simply because fewer nets were used in the fishery. No management plan was responsible for



the reduction in gear. It was merely a case of such vast depletion that many of the fishermen couldn't make a living, and had to drop out. The increase in shad resulting from this decrease in fishing was, however, maintained and further built up by the application of sound management. At the present time, Hudson River fishermen are enjoying better runs of shad than ever before in the history of the fishery and by the same token Maryland watermen can and will enjoy equal benefits.

Before we go further into the Plan, let's review in a few words the status of Maryland's fisheries. We find an alarming decline. Shad catches

have dropped from 7,128,000 to 446,000 pounds, and herring from 19,767,000 to 4,678,000 pounds in the fifty years between 1890 and 1940. Besides these fish of major importance, other less valuable species have shown similar decreases. White perch have dropped from 1,150,000 to 601,000 pounds, and yellow perch have shown a decrease from 1,370,000 to 189,000 pounds during the same period of time.

Maryland watermen recognized a need for restorative measures, and in 1940 held a series of meetings throughout the tidewater counties to devise a means to rebuild their shrinking industry. In their deliberations, they had the guidance of scientific data and principles. The Maryland Management Plan was the result. It is, therefore, the fishermen's own plan, expressing the ideas of men who know best just what procedures can be beneficial to the fisheries, and still allow the fisherman to do his job to the best of his ability. The object of the Plan is not only to protect the fish, but the fishermen as well. It assures the waterman a constant, *increased* income, and at the same time promotes the restoration of the tremendous wealth of Maryland seafoods.

At this point, let's apply management directly to the Bay, and see what results we obtain. The occasional appearance of an unusually large run of fish is an occurrence familiar to all Chesapeake watermen. Equally familiar is the accompanying influx of "fair-weather fishermen," men who ordinarily follow other lines of work and who are simply drawn into fishing by the opportunity for an easy income. The results of such an influx are obvious—first, a glutted market, with reduced prices which prevent the regular, full-time fishermen from reaping their fair shares of the "bumper crop"; second, a serious reduction in the brood stock of fish which would assure a good run in succeeding years if only the *normal* number of men were operating; and third, the depletion in a single year of a crop of fish that would supply the full-time watermen for three or four years with fish of constantly increasing size and value. The fishermen recognized that by holding their numbers, consequently their catch effort, at a level that would assure sufficient brood stock to reproduce successfully year after year, they would not only allow additional fish to increase in weight and value, but they would effect the increased income previously mentioned.

The idea cannot be too strongly emphasized that the fisherman loses nothing by allowing some of the fish to escape his nets. Since a fish can be caught and marketed only once, it is obvious that a fisherman should get as much as he can in pounds and dollars when he does catch that fish. A fish which escapes the nets for a season not only increases in value, but has the opportunity to spawn and add materially to the stock of the fishery.

However, the fisherman can't stand by and wait for the fish to grow up before he sets his net, and the Management Plan doesn't ask him to do that. In contrast to that of the Hudson, Maryland management will not operate on a basis of reduced fishing. *The number of fishermen will not be reduced.* Rather, it will be held at its present level until increased yields indicate that additional licensing will not injure the fishery or the fishermen operating at that time. Fishermen now operating will not be put out, or have their gear reduced, but additional men will be kept from entering the already too-intensive industry.

Now you ask, very naturally, how do you know when enough fish are left in the water to lay eggs and in turn assure the fishermen and the consuming public a high level and continued maximum supply of fin fishes? Or, how do you know when new men can obtain licenses without depleting the fishery? Is it just magic that some of the federal or state people have pulled out of a hat, or is there sound factual information basic to a practical management plan?

There certainly is no magic in fish scales. Most of us have experienced considerable difficulty in our attempts to remove them. But to the biologist, the fish scale tells an important story. As an example, let us consider the relatively large scales of the shad. When magnified, many very fine lines, arranged in a definite pattern, may be seen. In the center of the scale the lines are close together and represent the scale development when the shad was only a few inches long and was living in the fresh waters near where it was hatched. When these central areas are measured, it is found that they vary in size depending on the stream from which they are taken. Thus, the differences in juvenile growth, permanently marked on scales, show that the adult shad, like ducks and geese, try to return and reproduce in the place of their origin. Further observations on magnified scales occasionally reveal one or more heavy irregular lines near the outer edge. These marks are brought about partially by a cessation of feeding and physiological disturbances at the time the fish comes back from the sea and during the period of spawning. They are, in reality, formed on the outer edge of the scale and are sealed in by succeeding scale growth after shad have ceased to worry about family matters and have returned to the sea. Examination of these scales tells how many fish are taken as virgin fish; that is, fish that have not as yet spawned and, therefore, have no reproductive value to the industry, in contrast to the number of fish that have had a chance to spawn once, twice, or three times as pointed out by the presence of spawning marks.

Many other fish; rock, croaker, trout, and white perch, to name a few, show in contrast to the fresh-water and spawning marks of the shad scale,

distinct annual rings, which are very similar to the age rings in a tree. Since each of these rings represents a year's growth, examination of a large number of scales provides an accurate index to the number of spawning fish in the catches at any given time. This is a thoroughly reliable criterion, supported by length, weight and sex determinations on thousands of fish over a period of years. In all cases the age readings of the scale parallel the development and maturation of the fish. It is, therefore, possible to ascertain with complete accuracy the spawning potential of any fish without actually examining the internal organs. In addition to an analysis of the number of spawners in the fish population, it is also possible, by means of age readings, to calculate the rate of capture of any given brood.

As a supplement to these biological findings, complete and accurate records of all commercial catches are vitally necessary. Maryland has established, in cooperation with the federal arm, a system of daily catch records. Each fisherman has been supplied with record forms, especially designed for the various types of gear. Submitted weekly, these records will present an up-to-the-minute picture of the catch by gear, locality and species. Upon such basic information as this and those items already mentioned, the administrative department can perfect its procedures of management and thereby enlarge the beachhead now established in the campaign for bigger yields and consequent greater wealth from Maryland's water resources.

More than half of my time on the program has elapsed, yet I have treated of only one aspect of our fin-fish research. Study of the shad, rock, white perch, yellow perch, and hard-head have gone on apace in an effort to provide tidewater fisheries administration with immediate information for use in policy formulation. Forage fish, such as the silverside, too, have received attention, while much is planned for the future in the way of abstract research projects too numerous even to be recited here, but work of a very considerable importance, however indirect.

A review of the Department's work on the blue crab would require much time. Five thousand crabs have been tagged in the many sections of the Chesapeake, while a like number was tagged along the Coast from Barneygat to Hatteras. The claim of watermen and of some conservationists that the crabs of the Bay are derived from the Ocean was definitely refuted since in no case did the returned tags indicate either a coastal migration or a movement from one major body of inland water to another. Chesapeake crabs were shown to have their origin in our waters, to grow to maturity in them and in these same waters to perform their biological mission. This work definitely cleared up an old and honest

belief in some quarters and the sham or the smoke screen behind which refuge was taken, short-sightedly, to ward off the introduction of a crab management program essential to restoration and maintenance of high levels of production.

Currently, our biologist in charge of crab work is coordinating his full-time efforts with those of the Service, referred to by Mr. Warfield, in an effort to further our knowledge about migrations in the Bay, growth stages, growth rates, hibernation, reproductive capacity, spawning potential, intensity of capture and brood reserve, concerning which factors much information has already been gathered. On the abstract side, studies on the gonads, on glycogen contents, and on musclature have been completed. Several other studies now are in progress.

Crabs have been shown to be short lived animals, the life span covering, as it does, three years. At fourteen months they mate and at two years of age the female spawns producing, altogether, about 3,000,000 eggs. True, the microscopic and other early stages are beset by many enemies. It remains a fact, however, that this animal and the industry based upon it represent about the most simple of all of our wild life resources to restore and build up. The present extremely low population in the Bay—our recent comprehensive survey in Maryland waters yielded less than 100 mature crabs instead of the many barrels that should and would have been taken in years of abundance—is inexcusable in view of the factual information the Chesapeake Biological Laboratory has made available to those who administer conservation policies. Indeed, apart from this body of facts, the very experience with successful crab repletion in 1925 points the way to rehabilitation of this resource, yet there has been no resort to this simple expedient of full protection of the egg bearing crab. Here science is far ahead of practice.

A three-year program, 1933-1942, of diamond-back terrapin hatchery study at the Laboratory showed that under Maryland conditions, the eggs of this reptile can be incubated and the young reared successfully for release in the creeks and guts where once they were found in very great abundance, with resultant added income to the watermen. When it is pointed out that these animals sold for as much as $128.00 per dozen in 1917, you will understand why they were virtually fished out. Considering their slow growth and the fact that ten or twelve years are required to produce prime breeding terrpain, restoration of the resource inevitably is slow. A hatchery, if established, would carry its own brood stock and provide protection for the eggs and care for the young during the critical first year of softness and defenselessness, at which time they are consumed by certain birds, certain rodents and other predators.

Terrapin do not consume food during the year in which they hatch, thus reducing to a low figure the cost of this suggested operation for repletion.

The oyster is Maryland's most valuable and extensive aquatic resource, the abundance, quality and value of which are reflected directly into the economic and social aspects of many thousands of Tidewater citizens. The Solomons Island work, consequently, was early directed toward this form. It has been a common expression of opinion among many watermen that the "Bay has changed," thus high yields can't be expected. Studies of the hydrography of these waters indicate their purity, with very minor exceptions, and give full indication that the depletion to which Mr. Warfield has referred is a man-made one, and not the result of adverse biological, chemical or physical conditions brought about by some mystical change. To the contrary, such studies indicate that Maryland's waters should exceed in production the hey-day oyster yields, that is, about five times the quantity that will be harvested this year.

The reasons greater oyster yields can be expected are, in addition to the excellent physical and chemical conditions already referred to: (1) the Maryland area is virtually without the major oyster enemies, boring snails and star-fishes. Intolerable low salinities preclude them. (2) The Bay is blessed by an abundance of nutrients derived from the vast drainage area of some six or seven states. Thus, richly fertilized, it affords abundant pasturage, diatoms and flagellates, for oysters. (3) The bottoms adaptable to oyster propagation, 265,000 acres, are for the most part of a highly satisfactory physical nature and situated rather ideally with reference to currents, etc., to be productive.

Our workers have charted the Bay in part as to its salinities, temperatures, nutrients, tidal effects and like factors. The time of spawning has been established. Producing areas have to an extent been determined as to their capacity to produce seed or to serve as growing and fattening bars. Experimental tests have established the best cultch material for use in rehabilitation work, i. e., shells in contrast to gravel, slag, glass, wooden objects and others. Our oyster biologists are now engaged in an extensive study of many of these same projects, state-wide, and still others in a cooperative program with the U. S. Fish and Wildlife Service in an effort to chart all of the major oyster areas to a comparatively full extent in order to make available to the administrative body, Department of Tidewater Fisheries, facts for a more comprehensive management program to secure seed, growth, fattening and, in general, the wisest possible use of funds to capitalize on the inherent natural advantages afforded by this body of water.

The Department of Research and Education, as such, is a comparatively new institution, although its work in aquatic biology stems back a quarter of a century. Its functions, assigned by law, are to cover all of the agencies listed in the chart already reviewed (p. 78). Expansion of its work to include such a diversified field will require time, consciousness of need of research in some cases, cooperation, and a recognition of the advantages, with exceptions, of a unified attack on the problems at hand.

Conservation and the Friends of the Land

LOUIS BROMFIELD
Author, Lecturer and Farmer

About four years ago in Washington a group of our first citizens, about twenty or thirty of them, got together and decided that something should be done about our national resources and that something should be done in an educational way. They felt—and quite rightly—that it was impossible by executive decree or even by legislation to impose any rules for improvement, any reforms which would be effective. The only way reforms of any kind are effective is when the people understand them and want them.

So this group of men got together and formed an organization which they called, very broadly—and I am very thankful to them and I am sure all the other members of the organization are, for taking so broad a title as—"Friends of the Land," because "Friends of the Land" is big enough to include all aspects of conservation, from the crab of the Chesapeake Bay to the elk in Montana and Idaho, soil, mineral resources, oil, forests, water, whatever it is.

They began very modestly—no money, no foundations of any sort. It was a spontaneous movement, and they set to work in that first summer. They held a national meeting in Columbus, Ohio, and from that small beginning has grown an organization which I can best describe as having gotten altogether out of control. It was formed by people who gave their time and paid their own expenses, and that is still true, with the exception of the technicians and the college professors whose salaries will not permit them to do that. In those cases arrangements are made for their expenses to be paid, but no fees have been charged. Meetings have been held, 100 to 150 meetings in the last two years, in all parts of America, and there grew up spontaneously in this organization the policy of forming local chapters.

What is remarkable about the organization is that it has never spent any money except on education. It publishes a first-rate quarterly magazine called *The Land*, concerned with all aspects of conservation, and if you would look at the list of contributors to that magazine, you would realize at once that the budget of no magazine in this country could possibly afford the list of names of those who contribute free of any fee whatever to *The Land*, because they believe in conservation.

The organization has formed *itself*. No one had an idea which he imposed upon the public. It formed itself, and the chapter idea grew up itself, and today we have chapters all over the country. They are forming far too rapidly for the national organization to take care of them. We have chapters all the way from one which started night before last in Morrow County, Ohio, in a little town called Mount Giliad, where ninety farmers, local bankers, the druggist, the hardware dealer, and the rest came together and formed a chapter—they range all the way from that up to what is probably our most distinguished and active and powerful chapter, the Pennsylvania chapter, which centers in Philadelphia. Mr. Williams, who made such a moving address here today, is one of the moving spirits of that chapter, Mrs. Fox is here, Mr. Pfeifer, and a great many others, and they have had an actual effect politically on the ocnservation program in the state of Pennsylvania, and that is very important.

There are some of the other larger chapters—Detroit, Chicago, St. Louis, Oklahoma City, and the rest—which have come into being lately that have devoted all their efforts and their finances simply to holding one or two, preferably two, large annual forums of this sort in their cities and bringing their distinguished speakers from all parts of the United States, fixing attention upon the whole program of conservation, acting as coordinating organization and bringing together under one head and in their forum, the local members of the Isaac Walton League, the Audubon Society, the garden clubs, the League of Women Voters, all the civic-minded and conservation-minded organizations in their community.

To push it a little farther, I can tell you about the state of Ohio. Pennsylvania Chapter has a remarkable record, but in my own state of Ohio we have been able to do a great deal politically, and one of the most gratifying things in the present campaign is that the four principal candidates in the primary for the nomination for Governor, two Democrats and two Republicans, are outdoing themselves to see which one can produce the finest program for the conservation of our natural resources in Ohio, and that is a great step forward. We are forward in Ohio on most of those things in any case, but to have your political candidates come out and put at the top of their list, as they have all done, a program for reforestation, for clean streams, for soil conservation, a plank in their platforms which deals primarily and comprehensively with the conservation program, is something almost revolutionary in the history of the United States.

I am finishing today, I hope, on an optimistic note. We have heard all the things that have been done in the past and all the things that are being done to correct them. My own optimism in the matter of conservation has grown considerably out of my experience in the last three years, in

which I have traveled about fifty thousand miles a year in this country, almost entirely in the interest of conservation. I have seen most of the states, and I have seen the progress which has been made.

You heard Dr. Bennett say this morning that it took him forty years to get into the Sears, Roebuck catalog; only twenty-five to get into Who's Who, but forty years to get into the Sears, Roebuck catalog. I know Dr. Bennett, and I know there is no doubt in his mind that of the two, the one he cherishes is the first eight pages of the Sears, Roebuck catalog.

That I pick out as an example of the progress which has been made by the whole program of conservation, because it is not so long ago, not more than four or five years ago, when conservation of the soil, of forests, whatever it was, was considered a problem of the farmer or the problem of the forester or the problem of the man who wanted hunting or fishing or something else. It was not tied up with our economic life, with our social life, with the life which concerns our national physical health.

In the last two or three years a remarkable thing has happened, in that people far and wide in this country have begun to understand that our greatness, our wealth, as Mr. Williams pointed out earlier, was not founded upon the fact of any extraordinary ingenuity or brilliance on our part. We are perhaps cleverer than a lot of people in the world, but it was founded on our luck and the fact of nature's having given to us a country with the greatest resources in the history of the world up to this time.

Suddenly we are beginning to come to an end of those resources, largely because we used them wastefully, recklessly, and greedily, and the pinch which we have all felt, either in taxes or in higher living costs, or in a hundred other ways—this increasing pinch which has been going on for twenty-five years and has become more and more perceptible in our daily lives—is not due to the New Deal or to Hoover or Coolidge or anybody else. It has not come from political reasons at all. It has come about because what is happening is that gradually, and perhaps all too rapidly, we are approaching the position in which Europe has been for at least five or six hundred years. We are coming down to the limitation of our resources. They are coming to an end, and that fact makes itself felt in every aspect of our economic and social life, and it is no good trying to kid ourselves that it comes from political reasons or from the program of this man or that man or from the Communists or from the reactionary Republicans or anybody else. It is fundamentally an economic thing based upon our resources, and that pinch is going to increase unless we take hold of our resources, conserve them, manage them, and, as is possible, increase them.

Agriculture is the fundamental industry. I don't have to argue that fact. It is so all through history, the history of every nation proves it, and in this country 53% of our population has an income directly derived from agriculture. I don't mean that all of them are farmers. I mean that the farmers who are on the land naturally have their income from the land, but every small town and village in this country, and even cities as big as Des Moines, Iowa, which has 150,000 people, derive their entire income almost entirely from agriculture and the land.

But it doesn't stop there. It goes on much further than that. You take a company like Sears, Roebuck; it is practically 90% dependent on agricultural income for its prosperity and profits. So are the agricultural machinery companies. But you go on much beyond that and you run into the realm of the oil companies, of the steel companies, and so on, and you find how much they are dependent, too, upon the land, upon our forests, upon our natural resources for their income and their prosperity. Lately they have come to understand that. Nobody has backed the soil conservation movement more actively than the agricultural machinery companies. They have contributed in cash to the Friends of the Land; they have spent all kinds of money on folders, information, and education. Sears, Roebuck & Company has backed us steadily, even to financing meetings throughout the Middle West. The Bethlehem Steel Company has put out one of the most beautiful pamphlets that has been done in America, called, "Your Land," which costs them a great deal of money, and which they continue to print and distribute, free of cost. You can write to them and ask for as many of them as you want to distribute. Sears, Roebuck took the first eight pages of their catalog published south of the Ohio River and devoted them entirely to soil conservation, and that is a revolutionary thing in American business history.

It goes on from there. The biggest backer in the state of Ohio of the Friends of the Land and the whole soil conservation program and forestry is the Ohio State Chamber of Commerce. In the past four years they have had three men who did nothing but go about the state organizing meetings and speaking to farmers, businessmen, bankers, on the subject. We have there an acute problem of diminishing water supply—underground water supply—as it affects industry and cities, and that is a problem which exists in some form or other in every state in the Union.

With us it is a very important one. I wouldn't want to boast in the presence of Marylanders, but for our size I suppose we are as rich an area as there is on the face of the earth, because we are a very rich agricultural state, and spread over the agricultural state are any number of big industrial cities—Cleveland, Columbus, Cincinnati, Akron, Youngstown, Day-

ton—you can list them almost indefinitely, and they are scattered over the whole of the state. Below those is another category of cities between fifty and 100,000 people, which are industrial cities, and a good many of those are largely dependent on water, either surface or underground water, in order to continue to be growing and active industrial cities.

I will take, for example, the city of Youngstown and tell you the problem which exists there. They are on the Mahoning River, which is a good-sized river and in the remote past the Mahoning River flowed with plenty of water twelve months a year. In Ohio, as here, there is just as much rainfall today as 100 or 150 years ago, but in Ohio and here—and it is so all over the country—cut-off forests, plowed-up lands left the better part of the state bare in the winter, and the rain flowed down the hills, and what began to happen to the water supply of Ohio was simply this: When the state was denuded in this fashion, when you had a heavy rainfall, about 60 to 75 per cent of the water which fell on the state of Ohio ran off the fields, down the roads, into the Mahoning River, and then down into the Gulf of Mexico, where nobody wanted or needed that water.

What happened to the Mahoning River, which supplies Youngstown, one of the great steel cities of the world, with water, was simply this: A year ago last May, the Mahoning River flooded to a point where the steel mills were within two hours of closing down from being flooded out. Exactly a year earlier than that, the steel mills were within twenty-four hours of closing down because there wasn't enough water in the Mahoning River to run them. Neither of these conditions should have existed, and both come about because the water ran off the state of Ohio and the flow of the Mahoning River became erratic, flooding in one season and drying up in another. It presented a great industrial problem to one of the great steel cities of the world.

In the meantime, they had begun building dams, but the dams do not solve the problem, because if you have a flood, a dam can only hold so much water, and the rest goes over and down into the Gulf of Mexico, and then when your river should be flowing and filling up the dam later on, it dries up, because the water has not stayed in the state, sunk into the ground, and come out again through springs as a source for that river. So in one season you have billions of gallons of water going over the dam, and a little while later the river will dry up, and your dam supply will be used and your dam be dry, and you still are not any better off.

The whole idea of building dams and reservoirs—I make my obeisance to the engineers—but their idea of solving anything is to build dams. The average engineer thinks, "We will put up a dam, and that will control

floods, and that will give us a reserve water supply, and so on." It has become abundantly clear in the last few years that that is not true. In the first place, all too often the dams, unless extremely well built and very large, wash out in flood time. The second is that if they remain there, unless the watershed above the dam is taken care of, that dam silts up, and presently you have no dam at all, but only a great mud puddle with no reservoir to hold water.

I have just come from Dallas, Texas, where they have built a great dam at a cost of five million dollars to secure a water supply. It lies north of the city, and it is fed by a river called the Trinity River, on the Trinity watershed. That dam has been in existence, I think, three years now, and measuring the amount of silt which comes into that dam from the Trinity River watershed, that dam is good for about from thirty-five years to Fifty years. By that time it will be filled up with the soil which belongs upstream in the watershed of the Trinity River, unless the farmers and the state take care of the watershed of the Trinity River and stop the erosion, hold the soil and water(and that is important) where it belongs, and let clean water flow twelve months of the year down that stream into the Dallas reservoir.

There is a great project afoot to take over the whole of the Missouri River watershed, the greatest watershed in the world—it is being rapidly formulated among the states and under federal control—to take over that watershed for the purposes of preventing floods, of holding soil in place, and in general to control and conserve the vast resources of that area. Building check dams, which will be kept dry in the dry season in order to be filled up to take up excess water in flood time, is a part of the program. But I am glad to say that quite recently the people working with that watershed plan realized this would not be enough. Any of you who know the Missouri River known the millions of tons of silt which come down the Missouri River, billions of tons every year, and how it changes its course at flood time and wanders all over Missouri, Kansas, and all the way up into Idaho and Montana to its source. That has come about largely through the denuding of the prairie country and the cutting down of certain forests, through overgrazing, and a lot of man-made reasons.

In the meanwhile there has been a wonderful racket going on in the bottom end of the Mississippi River. It has made millions of dollars for contractors, and it has produced in effect no results whatever, and that is the building of dikes and levees on the lower reaches of the Mississippi River. That is altogether the wrong way of going at it. You have to go at it at the other end, and I am glad to say, as I have said before, that engineers and other planners, are becoming aware of that fact. You have

to go up and replant and manage the forests at the top; you have to farm the land properly; you have to keep your meadows properly; you have to cease overgrazing your pastures, and then your water doesn't get away at the top. It doesn't come rushing down the river and make those great floods at the bottom of the Mississippi which nobody has ever been able to control, because when you get a first-class flood, the dikes break way and then you have to build all over again.

It has been a fine racket for the contractors, but nobody else, and I am glad to say we are beginning to attack the problem from the side of wise applications of the soil, proper forestation, proper agricultural methods, and stop your water from running off.

We have in the state of Ohio the perfect example of that. One of the big tributaries of the Ohio River is the Muskingum River. The headwaters start very near my own farm, and it is a project in which I have been interested for a great many years and which I followed very closely not only as a farmer and a citizen, but as a member of the Conservation Commission of Ohio. You had this flooding condition in that area which would sometimes run as high as 40 or 50 million dollars' damage in that one waterway in a year.

Through Federal and state cooperation, engineers came in there and built fourteen dams, and they reforested a large part of the area, and they checked those floods. The project cost between 40 and 50 million dollars, and from the moment it was completed, there has been no more flood damage in that whole watershed. In otherwords, those dams paid for themselves virtually in one year; in two years at the outside. They paid for themselves in cash value to property owners, to insurance companies, and all the rest.

But the story didn't end there, and this is another phase of conservation on which I think too little emphasis is placed. That area in our state became a kind of paradise in a very short period. With the reforestation, with the conversion of the areas about these lakes into recreation areas, we have now as beautiful a wild country down through the Muskingum District as there is anywhere in the world, and we have there in the middle of the state of Ohio, only fifty or sixty miles from Akron, Youngstown, Canton, big industrial cities, some of the finest fresh water fishing there is in the world.

I will tell you a brief story about that and what happens to lakes and streams from the sportsman's point of view. During the days when the land in that watershed was badly farmed and there was no restraint on the amount of pollution that was dumped into the river by cities and factories, a whole series of streams, the Clear Fork, the Black Fork, the

Muskingum, the Coshocton River, all of these rivers emptying into the Ohio, once famous fishing rivers, became hopeless. They became filled with carp and catfish and gizard shad, all the coarse fish which no sportsman wants and few people would bother to eat, and the population of bass and bluegill and crappies, of all the game fish went down hill.

Then when the flood prevention project came in, and with the other circumstances, those waters began to clear up again because these dams formed, among other things, settling pools so that they took the silt out of the river. At the points where they impound water, they will also impound a tremendous amount of silt and clear up the water. The water flowing into a dam can be muddy, but the water flowing out of a big dam will be clear as crystal.

But added to it was another rather tragic aspect. That was the fact that the river cleared up, because in this period of twenty-five or thirty years, farms in that area by the hundreds, by the thousands, had been so ruined by bad farming and by erosion that they had ceased to be farmed and became a kin of desert land which sodded over with weeds and goldenrod and young forest growth, and so no silt came off those farms. In other words, the land, having been ruined by the hand of man, was turning again into a wilderness, and as it turned into a wilderness the water in those streams cleared up again, and then a miraculous thing began to happen in the streams themselves.

The carp, the gizard shad, the catfish, began to disappear, and back came in great quantities the bass, the bluegill, the crappie, the muskellunge. That is an extraordinary watershed, the only watershed in the world which has muskellunge. They are a Great Lakes fish, and we have them for some mysterious reason in that watershed in Ohio, and you can catch muskellunge up to 20 or 30 pounds in the Muskingum River at any time.

But the miraculous thing is that once the water cleared up, you had your valuable fish back. You not only had them back, but you had them back in such quantities that even the number of fishermen who come from our great industrial cities for sport in those reservoirs and lakes, in those streams, cannot deplete the number of fish there are there. The Conservation Commission, through our Fish Bureau in Ohio, has been able to keep a very close check; and actually what happened in Ohio with the clearing up of our streams and our lakes was that we have closed our last fish hatchery. We don't hatch fish and put them out into streams any more because we don't need to, and the Fish Bureau in the person of their expert, Mr. Tom Langlois, came before the Commission last year with the most extraordinary proposal that we go into some of the lakes and streams

and seine out some of the fish, because he said there were too many and if you took out a few, your fish would be bigger, and better sport for the fisherman.

The Conservation Commission sat on that with a firm hand and we still have plenty of fish. But the point I am leading up to is that if you follow out in conservation your three great fundamentals, soil, water, and forest, you not only produce economic prosperity for the country and a water supply for your industry, but you have clean streams; you have a kind of paradise for everyone concerned; you take care of your farms, your forests, and your water; you don't have to worry about putting fish in streams for sportsmen. You don't have to worry about hatching pheasants and putting them out. When you have the proper natural conditions, these will exist in quantity, and in Northwestern Ohio, a fourth of the state or more is a perfect answer to the question of pheasants. Once the proper conditions were established there were plenty of pheasants. We have not had to hatch or put a pheasant out in that area for years past. On the contrary, the pheasants have become a pest, and from the sportsman's point of view it is in truth a paradise because the hunter goes to the average farmer and the farmer says, "You go in and shoot some of these damned pheasants off my place. There are too many of them." My point there again is that if you create the conditions, you will have recreation, sport, clean water, and so on.

I lived for a great many years in the north of France where I had a farm. That was 28 miles from Paris, and there in the state-managed forests, which were handled beautifully, you had any amount of deer and wild boar. We could look out across the field any time in the summer and see a deer, or a couple of sows and little pigs making their way across the fields. There were pheasants, and grouse were abundant; but they had the proper conditions, and they had the proper conditions because the French were good farmers.

Our American farmers were among the worst farmers in the world in the past. There have been few farmers as reckless, as bad, as greedy, and as ignorant as those who have made the record of agriculture in this country. I have lived a good part of my life in Europe, a good part of it in the Far East, and there are bad farmers in the Far East; there are very few bad farmers in Europe. In France itself I should say there are no bad farmers. France, let me point out, because she had good farmers, because she took care of her soil, is the one country in Europe which has been able to feed herself and export food, which she always did, and that must go down to the credit of her peasants who were intelligent and handled their land properly.

There is just one thing I want to say as an optimistic note. That is, for the last twenty-five or thirty years something has been going on in America which was extremely important. It has been a kind of ferment bubbling up here with the Department of Agriculture experts, the agricultural college people, intelligent farmers, cranks, gardeners, all kinds of people; but when you add it all together, it all adds up to one thing. Every one of these improvements in our agricuture is headed toward the same point, and it is a kind of revolution, it is becoming more and more clear, and it is a revolution away from fighting nature in agriculture and toward working and cooperating with nature. Every new method, every new measure, all the way through—the terracing, the contour plowing, the proper handling of wood lots, all the way through Mr. Faulkner's book, "Plowman's Folly"—wherever anything new has come up, it is all in that direction.

We violated nature in this country for 150 years or more, and our farmers started in the East and they went like a plague of locusts all the way across to the Pacific Ocean, not farming the land but mining it all too often. I don't say there are not good farmers in America. There are. There are a few good farmers of pure, long-standing American ancestry, but the great bulk of the good farmers are the ones who have come from Middle Europe and have known the value of land and cherished it. Our own American agricultural attitude toward the land has always been to mine it rather than to farm it, and that can lead only to one thing. The farmer settled in Pennsylvania, wrecked a farm there, moved on and took land in Indiana "for free" or a dollar, wrecked that, went on to Nebraska, and on to the Pacific Coast until there wasn't any more, and today there isn't any more land. We have to take care of what is left to us.

This whole movement, which is beneficial, which is beginning to solve our problem, is a finding a new kind of agriculture suitable to America. The great mistake was that all of us and our ancestors brought agricultural methods from Central and Northern Europe where the climate was completely different, where in the seventeen years I operated a small farm there and knew agriculture very well, I saw only once a heavy rainfall comparable to any one of the thunder storms which we get fifteen or twenty times a year on my farm in Ohio. I never saw anything comparable to the cloudburst which we had there two days ago, when during the night nearly two inches of rainfall fell on my part of Ohio.

No such thing happened in that part of the world; nor did you find in Central and Northern Europe a variation in temperatures ranging from 105 degrees in summer to 40 degrees below zero, Fahrenheit, in winter.

You don't find winds and tornadoes to cause dust storms. We brought over with us what were perfectly sound agricultural methods in that part of Europe, where rain fell gently about five out of seven days, and where none of these violences of climate existed. We brought over those methods and put them in practice in a country with as great a variety of soils as this, and with the climate of unsurpassed violence which we have here, and the results were disastrous.

Now we are adopting a method that is suitable to this country ,that takes into consideration all these things, and it includes the rebuilding of soil which we have neglected very badly in this country. It recognizes the fact that you can't take out of the soil more than you put into it.

And it isn't only for the agricultural value of raising food that we must go on with this program. Ahead of us lies a program far beyond mere food. A lot of our industry in the future is going to be founded on agriculture. It is founded on agriculture already—oils, plastics, all the other things that come out of it. I was talking in Oklahoma City, one of the richest oil cities in the world, surrounded by oil fields, and I said, "It is all very well to have all this oil coming out of your oil wells, but the time isn't too far off when your oil wells are going to be empty and then what will become of Oklahoma City unless you have taken care of your soil and you can grow your oil in the fields around Oklahoma City?"

I talked in Des Moines about two weeks ago. The day before I spoke there, I had gone out to Henry Wallace's place to see his hogs. There had been a heavy rainfall. I was in the richest agricultural area, probably, in the world, better even than Ohio (but we have industry there; we have industry along with it, which helps). The city of Des Moines, a city of 150,000 people, is 95% dependent on agricultural income for its wealth and prosperity. The day I was there, I saw on all the rolling places—not all of them but most rolling places—where five, six, seven feet of Iowa topsoil had disappeared and you were down to hardpan.

It had rained the day before and the ditches were full of black prairie virgin soil. We passed the Raccoon River. It wasn't flowing water at all; it was flowing rich, greasy, oily mud. I said in Des Moines, "What was going down the river was not just mud and water and topsoil. What was going down the river were your banks, your insurance companies, your department stores, your real estate values, the inheritances of your children."

That is what has been going on in the past and is still going on today in too great a degree. The reason meetings like this today are important, first of all, is because there are so many of you here, because it shows an evidence of interest, and because today almost anywhere in America you

can have a meeting and have the same kind of audience. You couldn't have done that ten or fifteen years ago, because people weren't aware of the danger. They are becoming more and more aware, even in politics. They even realize that conservation is an awfully good asset to be elected on as governor or senator or legislator, or whatever it is.

I am deeply encouraged by the progress which has been made and which is being made in this country, but the job is by no means finished. If we put the job through to the end in our forests, our water and our soil, this country can be a paradise even far beyond that which we found when we first came here, because with modern technology, with industry, with the conveniences we have today, there is no reason why we cannot enjoy them side by side with the most productive country, with a country which provides sportsmen and fishermen with everything they seek, a beautiful outdoor life, with prosperity for the farmers, as a basis for our industry itself.

There are no limits to what can be done with the resources which are still left in this country, provided we take care of them, preserve them and build them up. There is a big job to do; there is a big job for every one of us in this room to do by going out and talking about it, telling other people who don't know, and spreading the whole doctrine. It lies at the very foundation of this country's present prosperity, and believe me, it lies at the foundation of our future existence.